

Exhibit 5 to
ADS Security, L.P.'s
Motion for Attorneys' Fees



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(12) **United States Patent**
Rosen

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(54) **THERMOSTAT SYSTEM WITH LOCATION DATA**

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Related U.S. Application Data

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(51) **Int. Cl.**⁷ **G05D 23/00**; F23N 5/20

(52) **U.S. Cl.** **236/51**; 379/102.05; 236/46 R

(58) **Field of Search** 236/51, 46 R; 455/420; 379/102.05, 102.5

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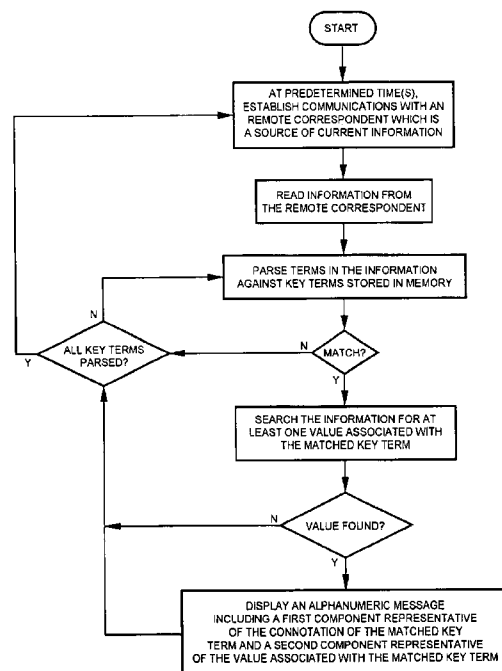
Primary Examiner—Harry B. Tanner

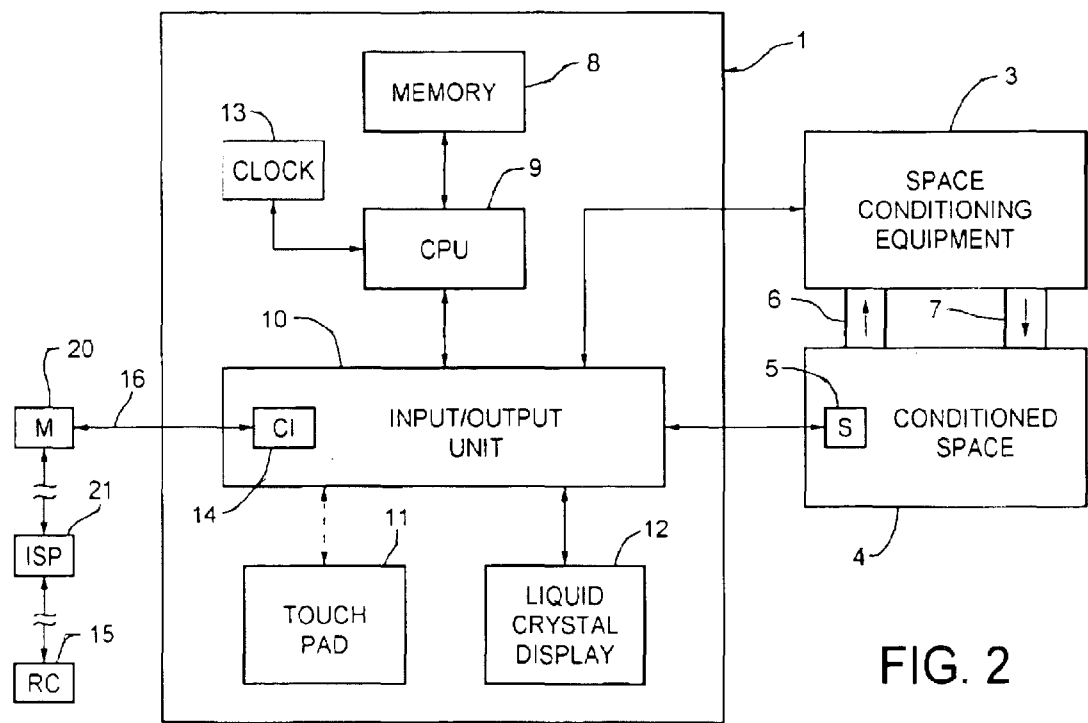
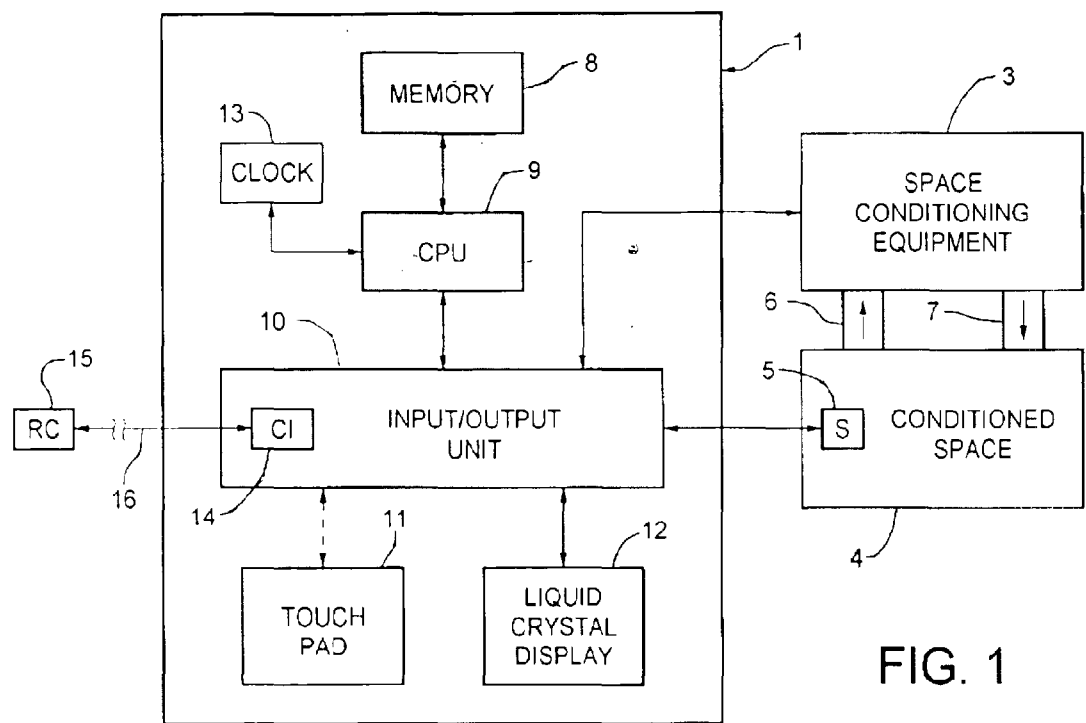
(74) *Attorney, Agent, or Firm*—David T. Bracken

(57) **ABSTRACT**

A thermostat system includes a temperature sensor, an LCD for selectively displaying an alphanumeric message and a processor having a memory for storing program and data information. In one embodiment, the data includes a table storing key terms on a predetermined subject. A communications interface connects the processor and a remote correspondent which is a source of current information. Periodically, communications is established with the remote correspondent to read the current information and parse the current information against the stored key terms. If a match is found, the current information is further searched for a value associated with the matched key term in order to display an alphanumeric message which shows a first message component representative of the connotation of the matched key term and a second message component representative of the associated value. In a variant embodiment, the remote correspondent provides a service periodically sending predetermined information for display on the LCD. In another variant embodiment, the thermostat system can use current information received from the first remote correspondent to send directive information to suitably change the temperature (or other parameter) set point at a second remote site.

12 Claims, 4 Drawing Sheets





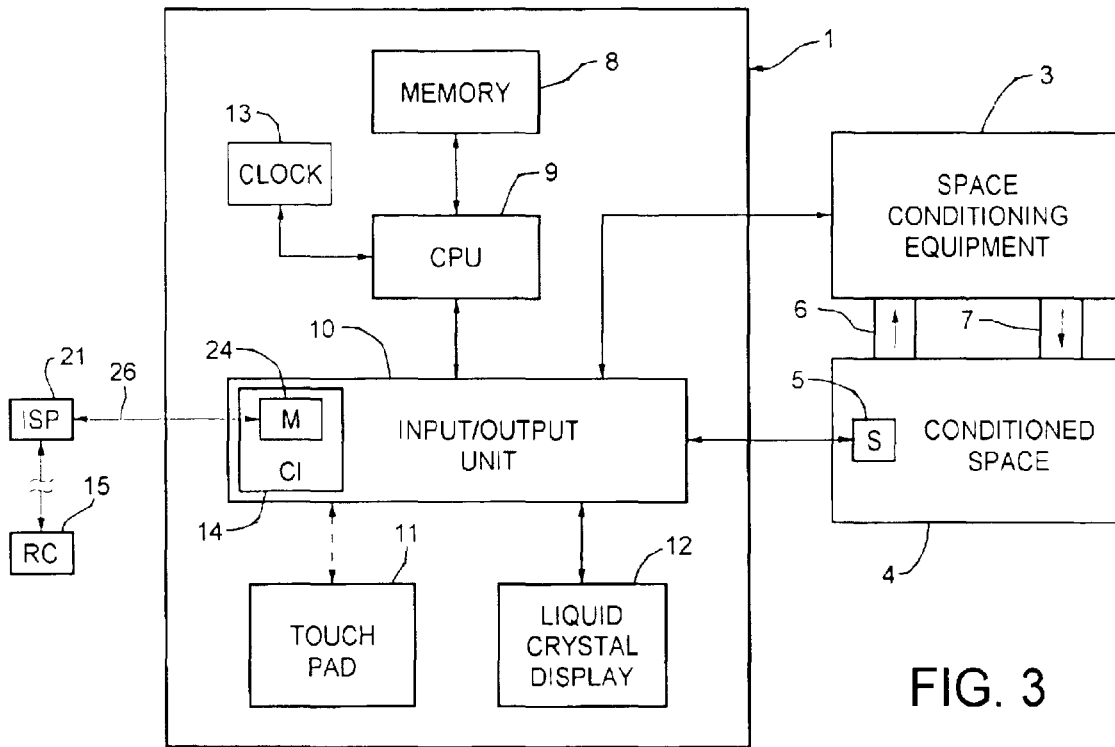


FIG. 3

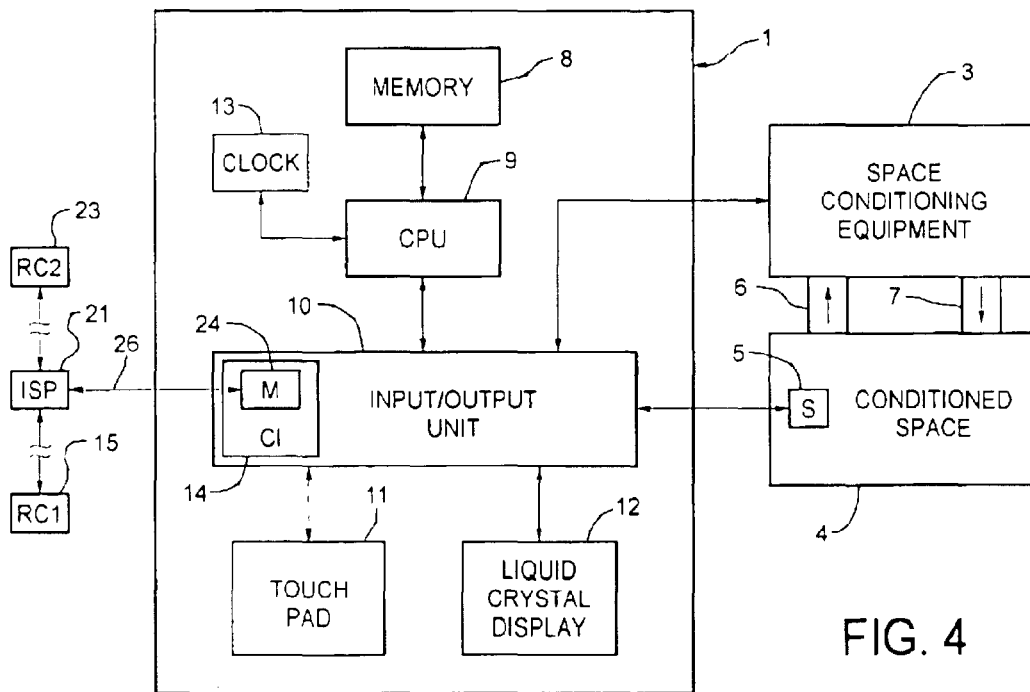


FIG. 4

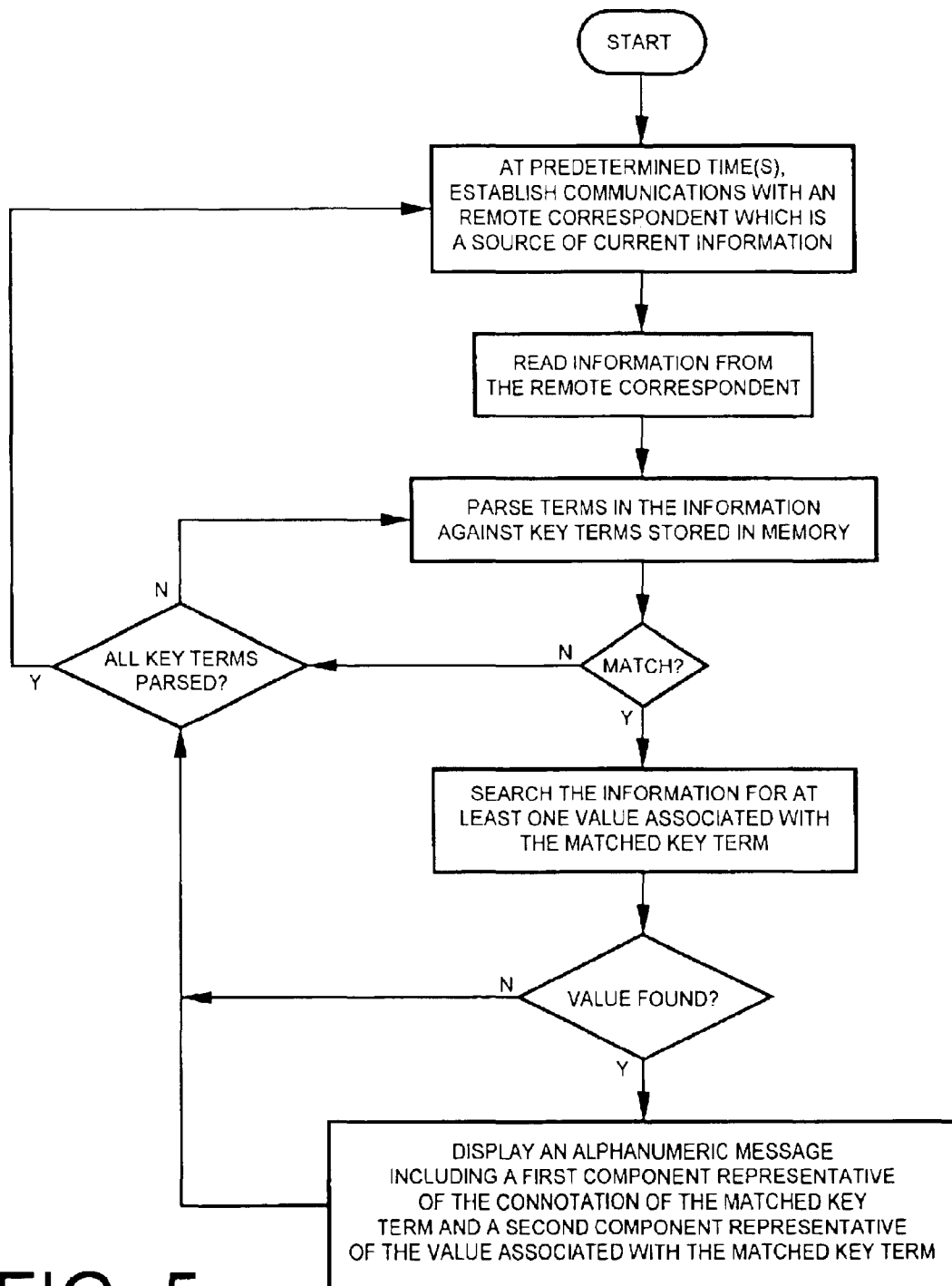


FIG. 5

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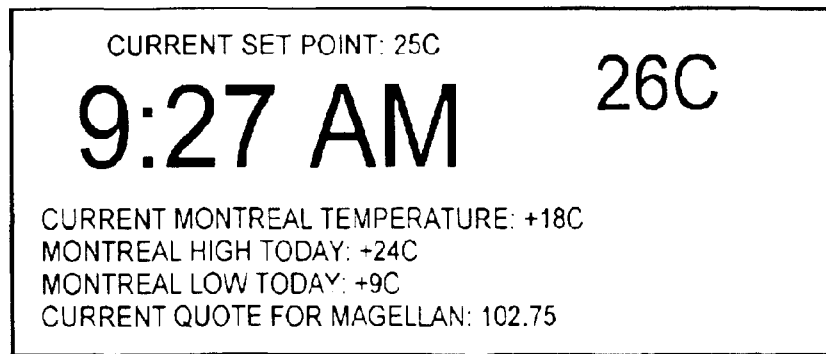


FIG. 6

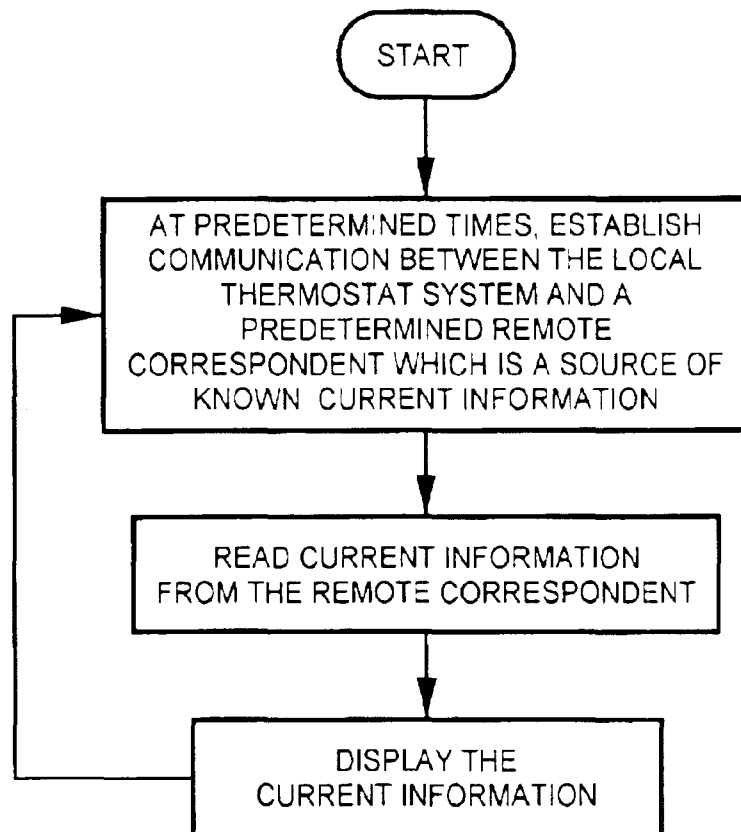


FIG. 7

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THERMOSTAT SYSTEM WITH LOCATION DATA

This application is a continuation in part of Regular Utility patent Ser. No. 10/075,886, filed Feb. 13, 2002 now U.S. Pat. No. 6,619,555.

FIELD OF THE INVENTION

This invention relates to the art of thermostats and, more particularly, to a thermostat system incorporating a communication interface for receiving and displaying diverse information from a remote correspondent. In an extended version, this invention relates to a thermostat system for receiving and displaying information from a first remote correspondent and selectively issuing an information/directive message to a second remote correspondent.

BACKGROUND OF THE INVENTION

Thermostats have been used for many years as a temperature sensitive switch which controls heating and/or cooling equipment for conditioning a space in which the thermostat, or a temperature sensor connected to the thermostat, is placed. In the well known manner, a simple thermostat can be adjusted to establish a temperature set point such that, when the temperature in the conditioned space reaches the set point, the thermostat interacts with the heating and/or cooling equipment to take suitable action to heat or cool the conditioned space as may be appropriate for the season.

Modern thermostat systems, which take advantage of the ongoing rapid advances in electronic technology and circuit integration, have many features which provide more precise supervision of the heating and/or cooling equipment to achieve more economical and more comfortable management of the temperature of a conditioned space. Many modern thermostat systems include a real time clock, a memory and a data processor to run a process control program stored in the memory to accurately measure the temperature of a temperature sensor disposed in the conditioned space and to send control signals to the heating and/or cooling equipment to closely control the temperature of the conditioned space. Modern thermostat systems permit anticipating and minimizing hysteresis or overshoot of the temperature in the conditioned space. In addition, the program can specify different set points at different times of the day and week and may also include a "vacation" mode which employs different set points when the conditioned space is not occupied for an extended period.

Many modern thermostat systems are programmable by a user. Typically, prior art programmable thermostat system employ a tactile touch pad with various fixed position buttons to be touched in a precise sequence to program set points (which may vary with the day of the week) for programmable time periods which may include a vacation mode. The programming sequence may be followed on a separate display, typically a liquid crystal display.

Other types of modern thermostat systems may limit, or even make no provision for, user programming. For example, thermostats distributed throughout a large commercial establishment may be programmable only by authorized persons employing special tools or may even have their programs permanently set at the time of manufacturer or installation. These non-programmable thermostat systems do not have a user accessible touch pad (or have no touch pad at all), but may incorporate a user readable display.

The present invention finds use in both programmable and non-programmable thermostat systems which operate under control of a processor.

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SUMMARY OF THE INVENTION

A thermostat system according to the invention includes: a temperature sensor for providing an electrical signal indicative of the temperature of a conditioned space in which the temperature sensor is situated; a liquid crystal display (LCD) for selectively displaying an alphanumeric message; and a processor having: a CPU, real time clock and a memory for storing program and data information. In one embodiment, the data includes a table storing key terms on a predetermined subject (e.g., current and predicted weather conditions in a given locale). A communications interface is adapted to establish bi-directional communications (via the Internet or some other suitable facility) between the processor and a remote correspondent which is a source of current information on the predetermined subject. Periodically, or on demand if provided for, a program stored in the memory causes the CPU to selectively: establish communications with the remote correspondent, read the current information and parse the current information against the stored key terms. If a match is found, the current information is further searched for at least one value associated with the matched key term; and if at least one such value is found, an alphanumeric message is displayed on the LCD to show a first message component representative of the connotation of the matched key term and a second message component representative of the associated value.

In a variant embodiment, the remote correspondent provides a service sending, periodically or on demand, predetermined information for display on the LCD. In this variant, there is no parsing against locally stored key terms. In another variant embodiment, the thermostat system can use current weather information received from the first remote correspondent to determine and act if the received information is such that a second remote correspondent interfacing with a remotely controllable thermostat system should be contacted, and send directive information to suitably change the temperature (or other parameter) set point at the second remote site.

DESCRIPTION OF THE DRAWING

The subject matter of the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, both as to organization and method of operation, may best be understood by reference to the following description taken in conjunction with the subjoined claims and the accompanying drawing of which:

FIG. 1 is a block diagram of a first embodiment of a space conditioning system incorporating a thermostat system employing the present invention;

FIG. 2 is a block diagram of a second embodiment of a space conditioning system incorporating a thermostat system employing the present invention;

FIG. 3 is a block diagram of a third embodiment of a space conditioning system incorporating a thermostat system employing the present invention;

FIG. 4 is a block diagram of a first embodiment of a space conditioning system incorporating a thermostat system employing the present invention;

FIG. 5 is a high level process flow chart describing the operation of the invention in a first embodiment;

FIG. 6 is a pictorial of an exemplary display illustrating information presented to a user by the use of the invention; and

FIG. 7 is a high level flow chart describing the operation of the invention in a second embodiment.

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DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring first to FIG. 1, a thermostat system includes a processor 1 and a temperature sensor 5 which is disposed in a conditioned space 4. The processor 1 and the sensor 5 may be situated in a common housing (not shown) or separated, all as very well known in the art. The common housing is usually, but not necessarily, placed in the conditioned space 4. Thus, those skilled in the art will understand that the block diagram of FIG. 1 is very general in order to best explain the invention.

The processor 1 includes a central processing unit (CPU) 9 in communication with a memory 8 which stores data and program information and also, via an input/output unit (I/O unit) 10, an optional touch pad 11 and a liquid crystal display (LCD) 12. The liquid crystal display may optionally be backlit by any suitable means (not shown). The memory 8 may include a read-only part which is factory-programmed and a random-access part which stores data subject to change during operation. A settable real time clock 13 is used to keep time in the thermostat system to facilitate diverse operations, such as different temperature set points (desired temperatures), during different periods of the day cycle. The thermostat system may be suitably powered by a battery (not shown) and/or from equipment to which is connected. The I/O unit includes a communications interface 14 for coordinating communications between the CPU 9 and a remote correspondent 15. The communications interface 14 may be, for example, a conventional serial port.

Thus, in the usual manner during normal operation, the temperature sensor 5 sends an electrical signal (e.g., if the sensor 5 is a simple thermistor, a resistance value; several types of temperature sensors are widely used) representative of the temperature within the conditioned space 4 which the processor can compare against a previously entered set point to determine if control signals need to be sent to the space conditioning equipment 3. For example, if the temperature in the conditioned space 4 is found to be too low when operation is in the heating mode, the processor 1 signals the space conditioning equipment 3 circulate, through ducts 6, 7, air from/to the conditioned space 4 which is heated by the space conditioning equipment before return to the conditioned space. This heating phase continues until the sensor 5 indicates that the space is now too hot (or approaching too hot) with reference to the set point such that the processor 1 sends signal(s) to the space conditioning equipment 3 to cease the heating function, all as very well known in the art. In a cooling mode, a counterpart procedure is followed. Those skilled in the art will understand that the control process typically includes such refinements as anticipation, hysteresis accommodation, fan control, etc. which are acknowledged, but are not directly relevant to the invention.

It may be noted that integrated circuit chips including all the processor components with all the necessary interface conditioning circuits are available off-the-shelf and are under constant refinement for increased power. The subject invention only requires the capabilities of such a processor, and off-the-shelf integrated circuit processor chips may be used to advantage in the subject thermostat system.

Consider now a first embodiment of the invention. Referring to FIG. 5 as well as FIG. 1, there is stored in the memory 8 (typically, in ASCII format) a series of key terms pertaining to a subject of interest such as the local weather. Exemplary key terms for this subject may be "temperature", "relative humidity", "high", "low", "barometric pressure", etc. The key terms may be stored in the memory during the

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manufacturing process of the thermostat system or, as will be described below, by user entry using the touchpad 11 and LCD 12.

At one or more predetermined times of day (and/or on-demand if provided for in the operating program) which have been previously stored in the memory 8 and established by the clock 13, the CPU 9 starts the process shown in FIG. 5 by issuing signals to the I/O unit 10 to cause the communications interface 14 to establish communications, via link 16, with a remote correspondent 15. The remote correspondent 15 has a known data communications "address" and, in the example, is a source of current information, such as local weather. Such local current weather information sources are widely available and are routinely accessed by, for example, using the Internet.

When the current local weather information is transmitted from the remote correspondent 15 via link 16 to the communications interface 14 and thence to the CPU 9, the CPU 9 parses the information against the key terms stored in memory 8 to determine if there is a match. This is easily achieved because the source code (e.g., HTML if the communication is via the Internet) of the information will typically also be in ASCII format. If the CPU 9 senses a match, the just-received information is searched for the presence of at least one "value" associated with the matched key term. If such a value is found and under control of the CPU 9, a first alphanumeric message component representative of the connotation of the matched key term and a second alphanumeric message component representative of the value associated with the key term are displayed on the LCD 12.

If no value for the present matched term is found, but more key terms in the present set are yet to be compared to information just received from the remote correspondent 15, the same process is repeated until all the key terms in the present set have been parsed and alphanumeric messages, if generated, have been sent to the LCD 12. The immediate session then ends.

As an example, assume that Montreal weather is of interest to an occupant of a conditioned space in the Montreal area which uses the subject thermostat system and that "temperature", "high" and "low" are the key terms for the subject of local weather stored in the memory 8. Periodically, as determined by times stored in the memory 8, the CPU 9 issues signals to access the remote correspondent 15 (a site providing local Montreal weather in the example) and download the current weather information as a data stream. If the CPU finds, by examining and processing the data stream, that the term "temperature" has been received, it looks for the next characters in the data stream which can be a value associated with "temperature"; e.g., it may quickly find "+18° C.". With this coupling established, the CPU may access the memory 8 to read the prestored alphanumeric message component "Current Montreal Temperature:" and then concatenate, as a second alphanumeric message component, "18C." and then send the complete message to the LCD 12 which displays: "CURRENT MONTREAL TEMPERATURE: 18° C.".

In a similar manner, if the key term "high" and an associated value are sensed, the exemplary message "MONTREAL HIGH TODAY: 26C." may be displayed; and if the key term "low" and an associated value are sensed, the exemplary message "MONTREAL LOW TODAY: 9C." may be displayed.

While an obvious application for using the invention is acquiring and displaying current weather information, other

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types of current information may be obtained and displayed in a like manner. For example, current stock quotations for stock indexes and individual stocks, mutual funds and the like can be automatically acquired, displayed and periodically updated by suitably programming the processor 1 with the address of a site which maintains such information current along with the desired key terms which may, in this example, be NYSE, etc. stock symbols. Thus, the "value" term would be the current stock quote. As an example, if the key term "FMAGX" is matched and an associated value of 102.75 is also found, the alphanumeric message "CURRENT QUOTE FOR MAGELLAN: 102.75" is generated and displayed. To closely track one or more stocks or funds, the remote correspondent can be accessed as often as desired to "refresh" the alphanumeric message showing the current quote. A wide variety of types of information may be programmed, accessed and displayed in a like manner.

It will be understood that the processor 1 can communicate successively or at different times with different remote correspondents. Thus, referring to FIG. 6, the current local weather information and the selected stock market information can be serially received and processed for display together in a manner which appears to be virtually simultaneous to a user. As previously noted, the overall display can be updated throughout the day at various times, as to each remote correspondent accessed, which have previously been entered in the memory 8.

If the thermostat system is programmable, the operating program installed during manufacture may provide for user entry following conventional instructions similar to those used in user-programming the climate control operation of the thermostat system. For example, assuming that the remote correspondent has an Internet address, the address may be entered using the touchpad 11 in any suitable manner as previously set up by a system programmer during software design. Then, various key terms the user wishes to employ with various remote correspondents having various addresses may be entered by a user.

As previously mentioned, the invention is not limited to use in programmable thermostat systems or even to thermostat systems in which correspondent addresses and key terms have previously been entered into memory 8. Still referring to FIG. 1 and also to FIG. 7, in a variant embodiment of the invention, a thermostat system communicates with a remote correspondent 15 which provides a customized service to the user of the thermostat system. In this embodiment of the invention, the user is a subscriber to the customized service in order to receive known current information on a predetermined schedule. At predetermined times (or on demand), data communications is established between the processor 1 and the remote correspondent 15 which, in this case, provides the customized service. The current information is downloaded and displayed. The resulting messages shown and periodically updated on the LCD 12 may be as shown in exemplary FIG. 6 if, for example, Montreal current temperature, daily high and low temperatures and the current quote for Magellan is what the user has subscribed to receive.

When the service is set up, the user and the business which provides the service via the remote correspondent 15 agree as to what current information (typically more than in the example) will be supplied on an agreed schedule. Depending upon the server-client relationship, either the processor 1 or the remote correspondent 15 may institute the current information transfer at the predetermined times or on demand.

While the Internet is not the only facility which the subject thermostat system may use to communicate with a

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remote correspondent, it is, at the state-of-the-art the most readily widely available and easily accessible. Thus, FIG. 2 show a typical coupling in which the communications interface 14 sends/receives serial data to/from an external (to the thermostat system) modem 20 via serial link 16. The modem conventionally interfaces with an Internet Service Provider (ISP) 21 which completes the communications link to the remote correspondent in the well-known manner. The modem 20 may be dial-up, cable, DSL or any other type suitable for the communications environment in a given installation.

At the state-of-the-art and as shown in FIG. 3, a modem 24 for communicating with the ISP 21 may be integrated into the communications interface 14 of the input/output unit 14 to eliminate the need for an external modem. Thus, when communications is established with the remote correspondent 15 according to a schedule or upon demand, the data transfer takes place via modem 24 and data link 26 as shown.

Attention is now directed to FIG. 4 which illustrates an optional extension of the subject thermostat system. It will be observed that the ISP 21 is not only in communication with the first remote correspondent 15, but also with a second remote correspondent 26. The second remote correspondent 23 may be another thermostat system (controlling another conditioned space (not shown) with other space conditioning equipment (not shown)) which can be remotely controlled. In this embodiment, data received from the first remote correspondent 15 as previously described may include specific information which can be interpreted by the processor 1 to require action at the site of the second remote correspondent 23. As an example, assume that the site of the second remote correspondent 23 is a temporarily unoccupied dwelling and that weather data received by the subject thermostat system indicates a predicted significantly low temperature predicted for the region of the site of the second remote correspondent 23. The processor 1 may determine, in response to this new weather information supplied by the first remote correspondent 15, that the heat should be turned on (or the set point raised) at the site of the second remote correspondent 23 in order to protect water pipes against freezing, warm the conditioned space controlled by the second remote correspondent in anticipation of its upcoming occupation, etc.

Those skilled in the art will appreciate that, in a large facility incorporating subdivisions in the conditioned space, each conditioned space having its own thermostat system, each of the thermostat systems may independently employ the invention as previously described.

The invention described above includes additional embodiments. In a specific example of these additional embodiments, a thermostat stores data that establishes its physical location for interaction with remote devices located away from that thermostat. Those other devices may be Internet sites transmitting weather data to the thermostat based on the geographic location of the thermostat. More generally, this embodiment uses location based interactions between an environmental controller (with one or more parts such as transmitter means, a display, data storage means or control means) and a remote device which responds to location data received from the controller.

Control means for an environmental controller, such as a thermostat, include the structure needed to turn HVAC functions on or off or change operation thereof, impose control setpoints or other control parameters, turn lighting on or off, sense and respond to environmental gases or smoke, or other of the several functions which may be

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accomplished locally or wirelessly by present day programmable thermostats and their distributed components. Transmitter means for the environmental controller include one or more wireless and/or wired connections to the remote device. In a specific example, transmitter means are a

Remote devices for the present invention include, as described above, Internet or computer network nodes or other similar devices that receive location data from the transmitter means. A response in the remote device may be as little as simply recording the fact that an environmental controller is at a physical location. Another form of response is for the remote device to use the location data in an operation or algorithm that creates an output stored at the remote device or transmitted from it.

In the above specific example, location data of a thermostat is transmitted from transmission means (a modem) through the Internet to a website maintained to have access to weather or climate information (the remote device). The weather website (the remote device) receives the location data and associates it with local weather data for the thermostat location, which is then transmitted to the thermostat through the modem (a response of the remote device). The thermostat uses the local weather data for display, stores it in storage means, and/or uses it within control means (a response by the environmental controller). The word "local" with reference to weather data is relative to a desired geographic range and/or time into the future.

The present embodiments of location data are for physical location of an environmental controller, not a specific network address such as an IP address which does not have geographical relevance. Presently, a prior art thermostat may already have stored in it for its network use a unique IP address that identifies the thermostat for control via inputs from the Internet. Location data, unless correlated with that IP address to create a code system, is different from the IP address.

This location data in one form can be as simple as a telephone number or portion thereof, a zip or postal code, longitude and latitude information or other systems or codes that correspond to location information. If location data is a telephone number, which would be easily input into the environmental controller with even a simple user interface, that telephone number can be "looked up" by a server and correlated to a geographical address. In a preferred form of the location data, a first environmental controller will have location data distinguishing it from all other environmental controllers. The way to distinguish between environmental controllers may be with specific codes, such as IP addresses, combined with physical location data which would be used for more than one environmental controller. In, this way, even nearby thermostats can have unique means of receiving geographical information pertaining to its climatic location.

To date, the prior art contains no environmental controllers that have geographical information, such as location data in the form of a zip code or telephone number, stored in them. Location data may take several forms as it is originally input into and through a local environmental controller, output to transmitter means, delivered to and processed by a remote device, and retransmitted by that remote device to the environmental controller or other remote device. Whatever its form, location data correlates in some way to the physical and geographic location of the

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environmental controller. For example, transmitter means may link the environmental controller to an intervening remote server which has stored in it a correlation between the specific IP address or other specific identifier and the physical location of that environmental controller. In that case, a specific IP address or specific identifier is the functional equivalent of location data and is included in its definition herein. The invention provides for intervening transmission and/or conversion of forms of location data of the environmental controller until the location data reaches a desired remote device.

As contrasted to the form of the location data, the present embodiments include several ways to make use of location data in a response by a remote device or remote correspondent. For example, it is well known that Internet web sites make certain information and/or algorithms available for use by the user linking to that web site, either for free or at a cost to the user. Automated means are preferred for linking the environmental controller to the web site and causing the web site to respond to the location data.

In one such form, an environmental controller links to a web site and transmits location data and an access code. The access code is appropriately received by the web site and identifies the user as one authorized to have transmitted to it information or algorithm results from the web site. The access code may be structured so that location data is a substantial part of that access code, i.e., the access code is the phone number of the physical location of the environmental controller. The access code may be evaluated by the server for the web site to determine if a previously approved access code is still valid, i.e., whether the user has paid their last bill for access to the web site. In a specific example of this type of response, a user of the invention environmental controller pays the operator of a web site with weather data for a period of access. The user is either issued an access code by the web site operator to be input into the environmental controller or the access code is some code specific to the environmental controller, such as the location code, and is accepted by the web site operator. An access code may include credit card numbers for instant acceptance and debiting at linking to the web site.

While the principles of the invention have now been made clear in an illustrative embodiment, there will be immediately obvious to those skilled in the art many modifications of structure, arrangements, proportions, the elements, materials, and components, used in the practice of the invention which are particularly adapted for specific environments and operating requirements without departing from those principles.

What is claimed is:

1. A location response system with an environmental controller located at a single physical location adapted to be an integral part of a system of environmental sensing or control for a local and substantially enclosed space comprising:

- A) a physical location of the environmental controller stored as location data in storage means in the controller;
- B) transmitter means connected to the controller adapted to transmit location data to a remote device physically remote from the controller, so that a location response is induced at the remote device; and
- C) location response is storage of the location data at the remote device and correlation of the physical location to location response data stored at or available to the remote device or created by processing of location data

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at the remote device, whereafter location response data is transmitted from the remote device to the controller.

2. The system of claim 1 in which said transmitter means includes a modem and the remote device is a computer network server.

3. The system of claim 1 in which said location data includes one or more of the group consisting of a local telephone number or portion thereof, a local zip or postal code, and local latitude and longitude of the physical location of the controller or systems correlated thereto.

4. The system of claim 1 in which the controller comprises control means which acts on a response of location data for thermostatic functions including structure needed to turn HVAC functions on or off or change operation thereof, impose control setpoints or other control parameters, turn lighting on or off, or those functions accomplished locally or wirelessly by a system of thermostatic control among distributed components.

5. The system of claim 1 in which the controller comprises means for input of location data by a user at the physical location.

6. The system of claim 1 in which location response is storage of the location data at the remote device.

7. The system of claim 1 in which location response is storage of the location data at the remote device and correlation of the physical location to location response data stored at or available to the remote device or created by processing of location data at the remote device.

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8. The system of claim 1 in which location response data is stored in the controller storage means.

9. The system of claim 8 in which stored location response data is displayed on a display screen at the controller.

5 10. The system of claim 8 in which the controller comprises control means for thermostatic functions including structure needed to turn HVAC functions on or off or change operation thereof, impose control setpoints or other control parameters, turn lighting on or off, sense and respond to environmental gases or smoke, or those functions accomplished locally or wirelessly by a system of thermostatic control among distributed components, and the storage means comprise control data for operation of control means and comparison means for comparison of control data to location response data and change of at least some control data in response to that comparison.

15 20 11. The system of claim 10 in which control data comprises temperature control setpoints for thermostatic control of the system and comparison means comprises means for changing one or more the temperature control setpoints.

25 12. The system of claim 10 in which control data comprises sunrise or sunset data for the physical location for control of local lighting and comparison means comprises means for changing one or more of the parameters for turning local lighting on or off.

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(12) **United States Patent**
Williamson(10) **Patent No.:** **US 7,151,968 B2**
(45) **Date of Patent:** **Dec. 19, 2006**(54) **INTELLIGENT COFFEEMAKER APPLIANCE**(75) Inventor: **Charles G. Williamson**, Columbia, MO (US)(73) Assignee: **Salton, Inc.**, Lake Forest, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 447 days.

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See application file for complete search history.

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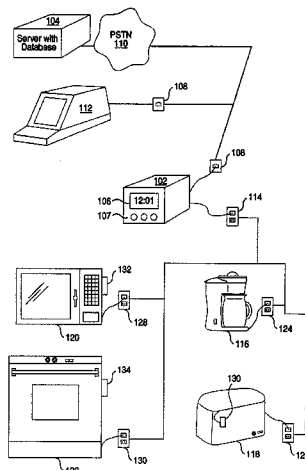
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Primary Examiner—Thomas Pham(74) *Attorney, Agent, or Firm*—Sonnenschein Nath & Rosenthal LLP(57) **ABSTRACT**

The invention may be broadly conceptualized as an approach in which a coffeemaker (116) receives a plurality of timer settings from a network and communicates the state of the coffeemaker (116) to another network device while keeping a real-time clock (1112) synchronized and correctly set by receiving period time synchronization messages.

29 Claims, 15 Drawing Sheets

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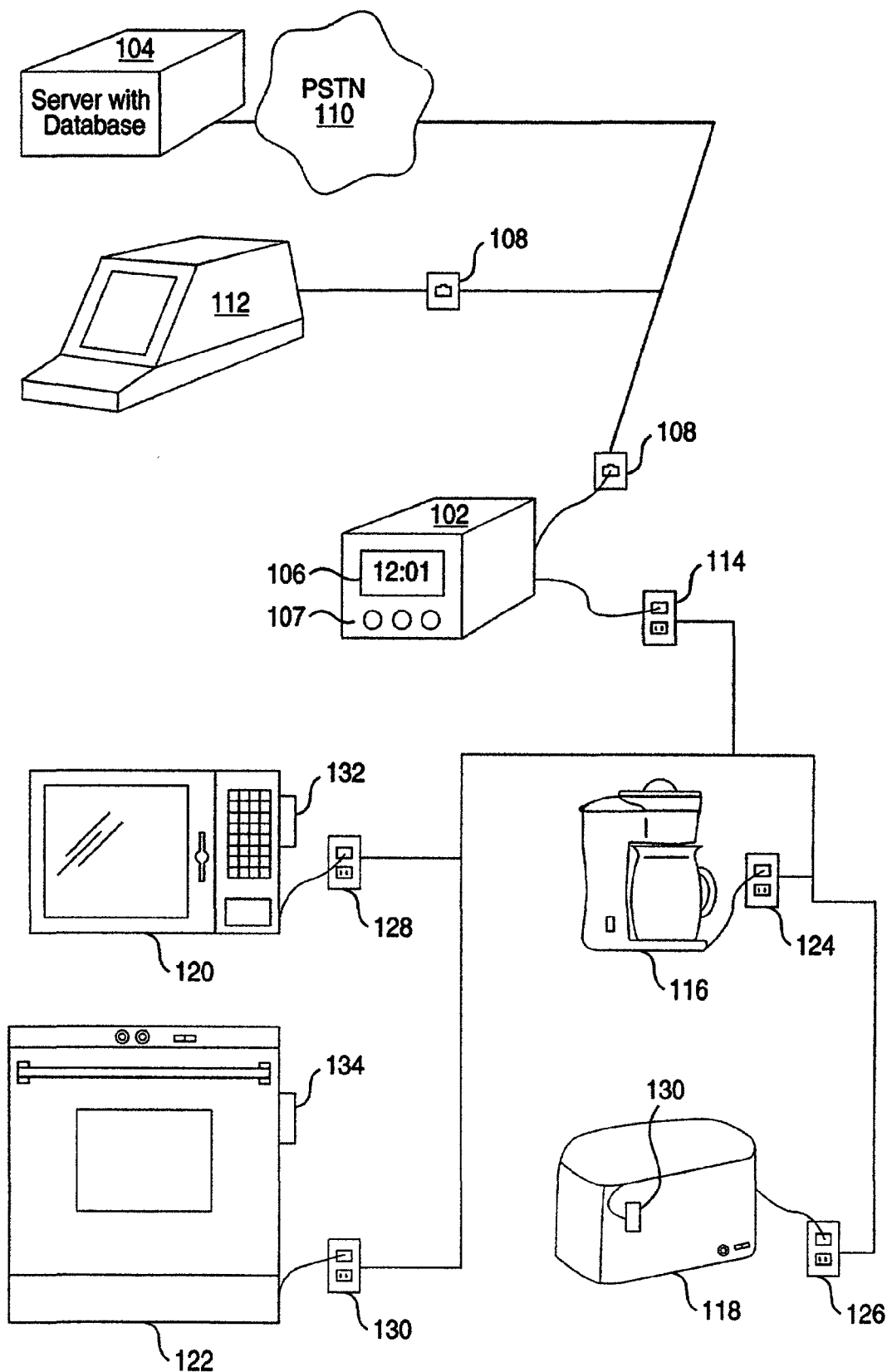


Fig. 1

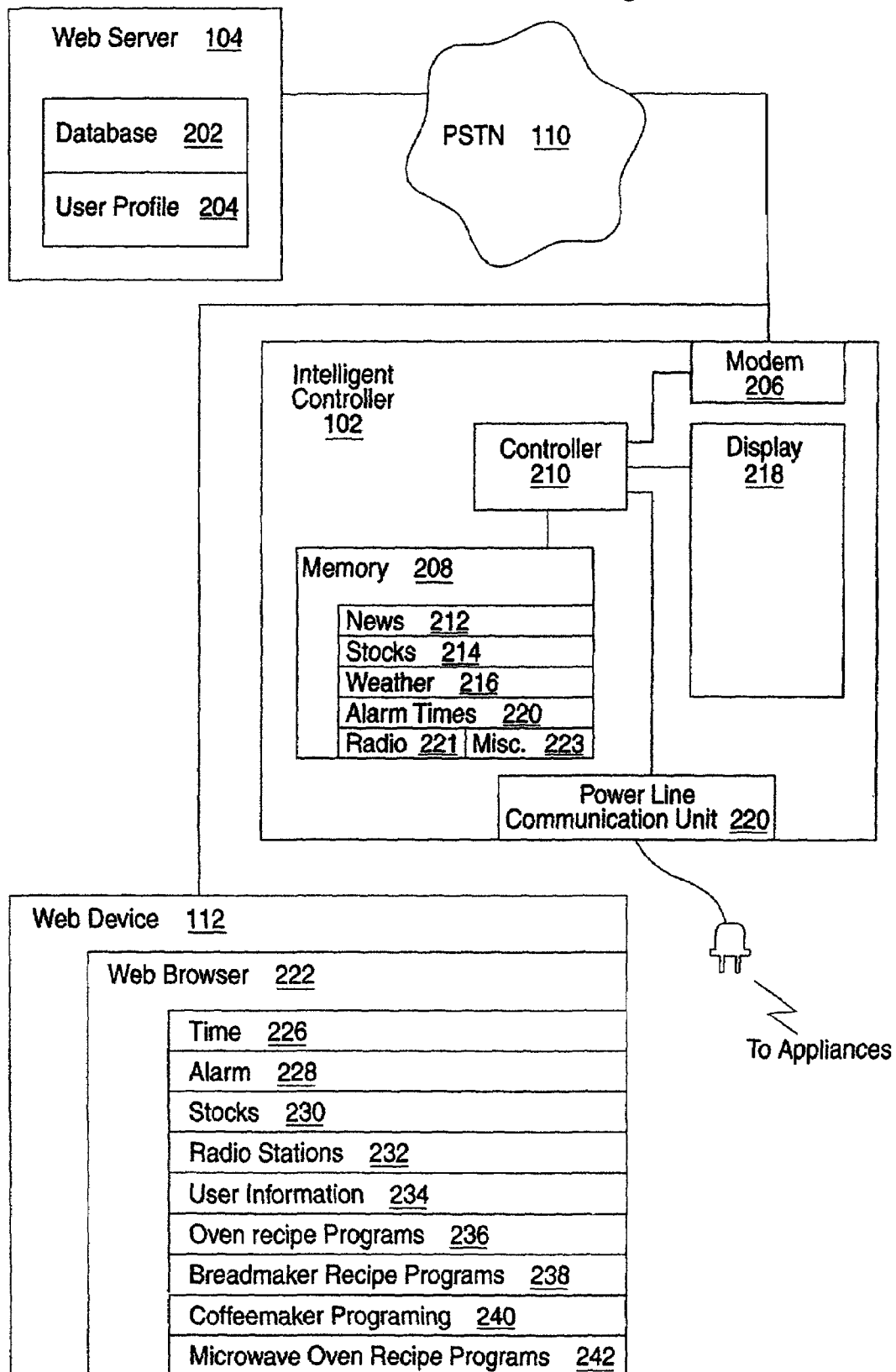
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Fig. 2



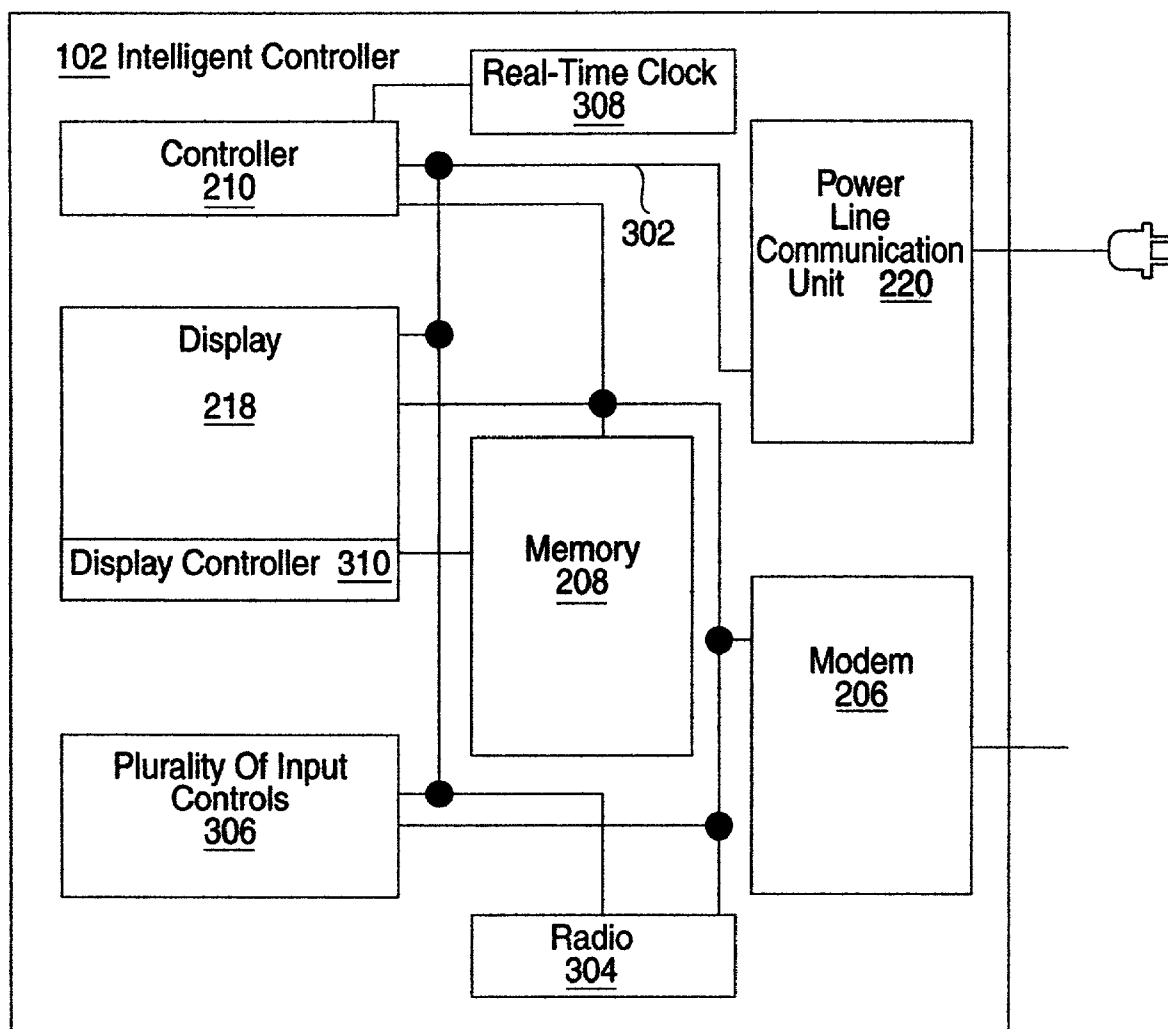


Fig. 3

Radio Locator - Microsoft Internet Explorer

Please select radio presets from the list below. You may set a maximum of

Available FM Stations					Selected Stations	Current
Freq	Call Sign	City	State		##	Call Sign
88.1	KDHX	ST. LOUIS	MO	<input checked="" type="checkbox"/>	01	KMJM-
89.1	KCLC	ST. CHARLES	MO	<input checked="" type="checkbox"/>	02	KDHX
89.5	KNLH	CEDAR HILL	MO	<input checked="" type="checkbox"/>	03	KCLC
89.7	KYMC	BALLWIN	MO	<input checked="" type="checkbox"/>	04	KNLH
89.9	KGNA-FM	ARNOLD	MO	<input checked="" type="checkbox"/>	05	KYMC
90.7	KWMU	ST. LOUIS	MO	<input checked="" type="checkbox"/>	06	WRY
91.5	KSIV-FM	ST. LOUIS	MO	<input checked="" type="checkbox"/>	07	KGNA-
92.3	WIL-FM	ST. LOUIS	MO	<input type="checkbox"/>	08	KWMI
93.3	KNSX	STEELVILLE	MO	<input type="checkbox"/>	09	KSIV-F
93.7	KSD	ST. LOUIS	MO	<input type="checkbox"/>	10	KFMO
94.7	KSHE	CRESTWOOD	MO	<input checked="" type="checkbox"/>	11	KSHE
					12	KIHT
					13	KFTK
					14	KHCR
					15	KSIV
					16	KFUO-F

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Fig. 4

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Alarm Settings - Microsoft Internet Explorer

Please set alarm schedule for each day of the week.

502 Day	504 Set Schedule On Time			506 Web Wake-up Station	Active	508 Current Day On T
Sunday	01	00	am	No Station	<input type="checkbox"/>	S 01:00
Monday	07	05	am	01 KDHX-FM	<input checked="" type="checkbox"/>	M 07:05
Tuesday	07	30	am	No Station	<input checked="" type="checkbox"/>	T 07:30
Wednesday	07	45	am	No Station	<input checked="" type="checkbox"/>	W 07:30
Thursday	07	55	am	03 KNLH-FM	<input checked="" type="checkbox"/>	T 07:45
Friday	07	40	am	08 WMLL-AM	<input checked="" type="checkbox"/>	F 07:50
Saturday	01	00	am	No Station	<input type="checkbox"/>	S 01:00

[Update Alarm Schedule](#)
[Return to Program](#)

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Fig. 5

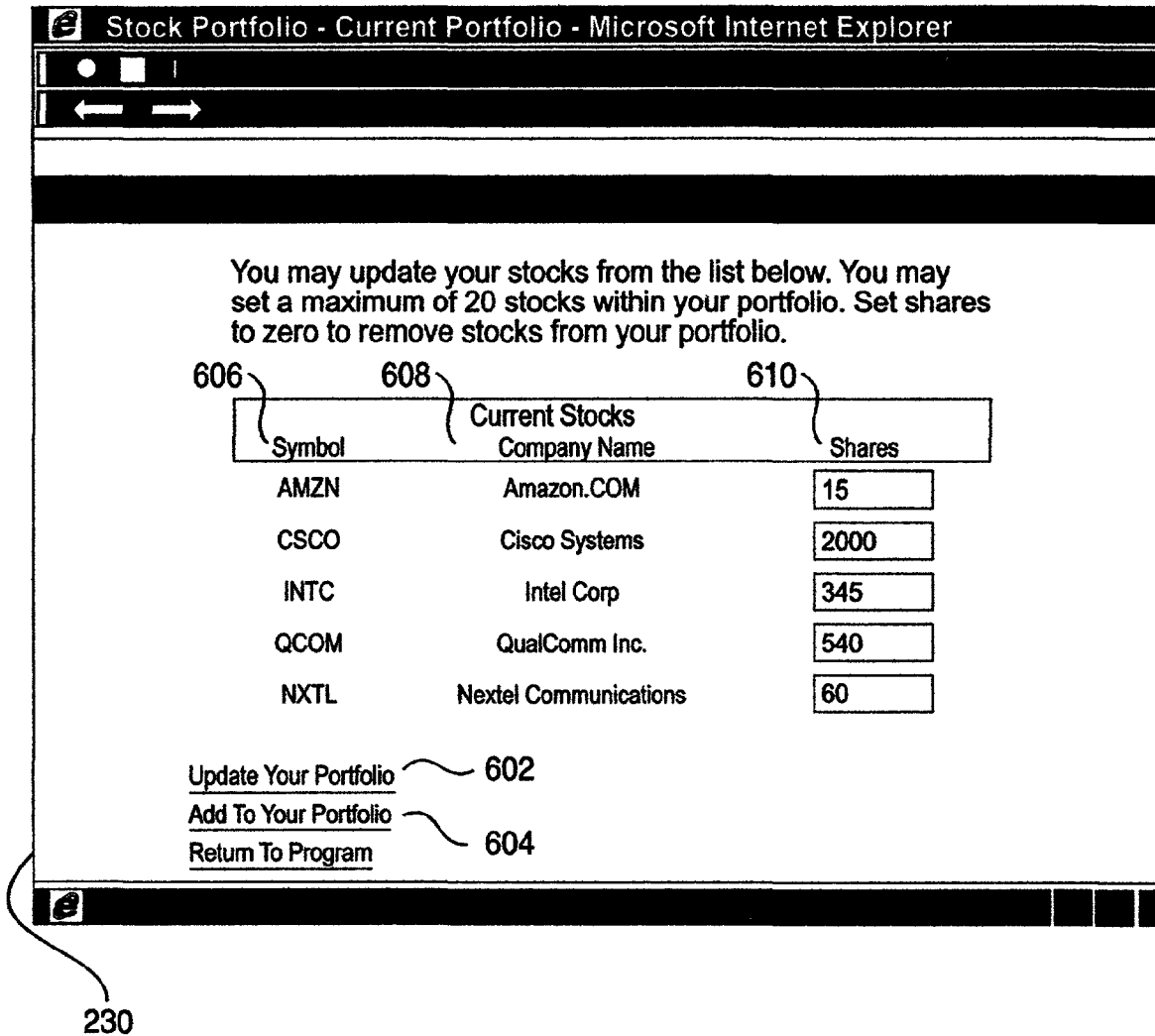


Fig. 6

Breadmaker - Pre-mix - Microsoft Internet Explorer

Please select pre-mixed bread programs from the list below. You may set a maximum of 20 pre-mixed bread programs.

Search Results		
Name	UPC	Selected
<u>Carrot Raisin</u>	89713578	<input checked="" type="checkbox"/>
<u>Peach</u>	23454872	<input checked="" type="checkbox"/>
<u>Banana</u>	56372623	<input type="checkbox"/>
<u>Southern Barley</u>	76236477	<input type="checkbox"/>
<u>Sunflower and Sesame Seed</u>	59834267	<input checked="" type="checkbox"/>
<u>White Wheat</u>	26835733	<input type="checkbox"/>
<u>Sourdough</u>	34748634	<input type="checkbox"/>
<u>Country White</u>	34735256	<input checked="" type="checkbox"/>
<u>Lemon Walnut</u>	23452648	<input checked="" type="checkbox"/>
<u>Pumpernickle</u>	24535676	<input type="checkbox"/>

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Fig. 7

Ultravection Oven - UPCs - Microsoft Internet Explorer

Please select ultravection programs from the list below.
You may set a maximum of 20 Ultravection programs.

Name	UPC	Selected
Old El Paso Nachos	89713578	<input checked="" type="checkbox"/>
Oscar Mayer Wieners	23454872	<input checked="" type="checkbox"/>
Betty Crocker Brownies	56372623	<input type="checkbox"/>
Sara Lee Chicken Cacciatore	76236477	<input type="checkbox"/>
Kraft Macaroni and Cheese	59834267	<input checked="" type="checkbox"/>
Ore Ida Cajun French Fries	26835733	<input type="checkbox"/>
Old El Paso Nachos	89713578	<input checked="" type="checkbox"/>
Oscar Mayer Wieners	23454872	<input checked="" type="checkbox"/>
Betty Crocker Brownies	56372623	<input type="checkbox"/>
Sara Lee Chicken Cacciatore	76236477	<input type="checkbox"/>
Old El Paso Nachos	89713578	<input checked="" type="checkbox"/>
Oscar Mayer Wieners	23454872	<input checked="" type="checkbox"/>
Betty Crocker Brownies	56372623	<input type="checkbox"/>
Sara Lee Chicken Cacciatore	76236477	<input type="checkbox"/>
Kraft Macaroni and Cheese	59834267	<input checked="" type="checkbox"/>
Ore Ida Cajun French Fries	26835733	<input type="checkbox"/>

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Fig. 8

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Coffeemaker Settings - Microsoft Internet Explorer

Please set brew schedule for each day of the week.

Day	On Time			Off Time		
Sunday	09	00	am	11	00	am
Monday	06	45	am	07	30	am
Tuesday	06	45	am	08	15	am
Wednesday	06	45	am	08	15	am
Thursday	06	45	am	08	15	am
Friday	06	45	am	08	15	am
Saturday	08	00	am	02	00	am

Update Brew Schedule

Return to Program

Current Day	On Time
S	09:00
M	06:45
T	06:45
W	06:45
T	06:45
F	06:45
S	08:00

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Fig. 9

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Microwave - UPCs - Microsoft Internet Explorer

Please select microwave programs from the list below. You may set a maximum of 20 Microwave programs.

Search Results		Selected
Name	UPC	
1002 Old El Paso Nachos	1004 89713578	<input checked="" type="checkbox"/> 1006
Oscar Mayer Wieners	23454872	<input checked="" type="checkbox"/> 1008
Betty Crocker Brownies	56372623	<input type="checkbox"/>
Sara Lee Chicken Cacciatore	76236477	<input type="checkbox"/>
Kraft Macaroni and Cheese	59834267	<input checked="" type="checkbox"/>
Ore Ida Cajun French Fries	26835733	<input type="checkbox"/>
Old El Paso Nachos	89713578	<input checked="" type="checkbox"/>
Oscar Mayer Wieners	23454872	<input checked="" type="checkbox"/>
Betty Crocker Brownies	56372623	<input type="checkbox"/>
Sara Lee Chicken Cacciatore	76236477	<input type="checkbox"/>
Old El Paso Nachos	89713578	<input checked="" type="checkbox"/>
Oscar Mayer Wieners	23454872	<input checked="" type="checkbox"/>
Betty Crocker Brownies	56372623	<input type="checkbox"/>
Sara Lee Chicken Cacciatore	76236477	<input type="checkbox"/>
Kraft Macaroni and Cheese	59834267	<input checked="" type="checkbox"/>
Ore Ida Cajun French Fries	26835733	<input type="checkbox"/>

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Fig. 10

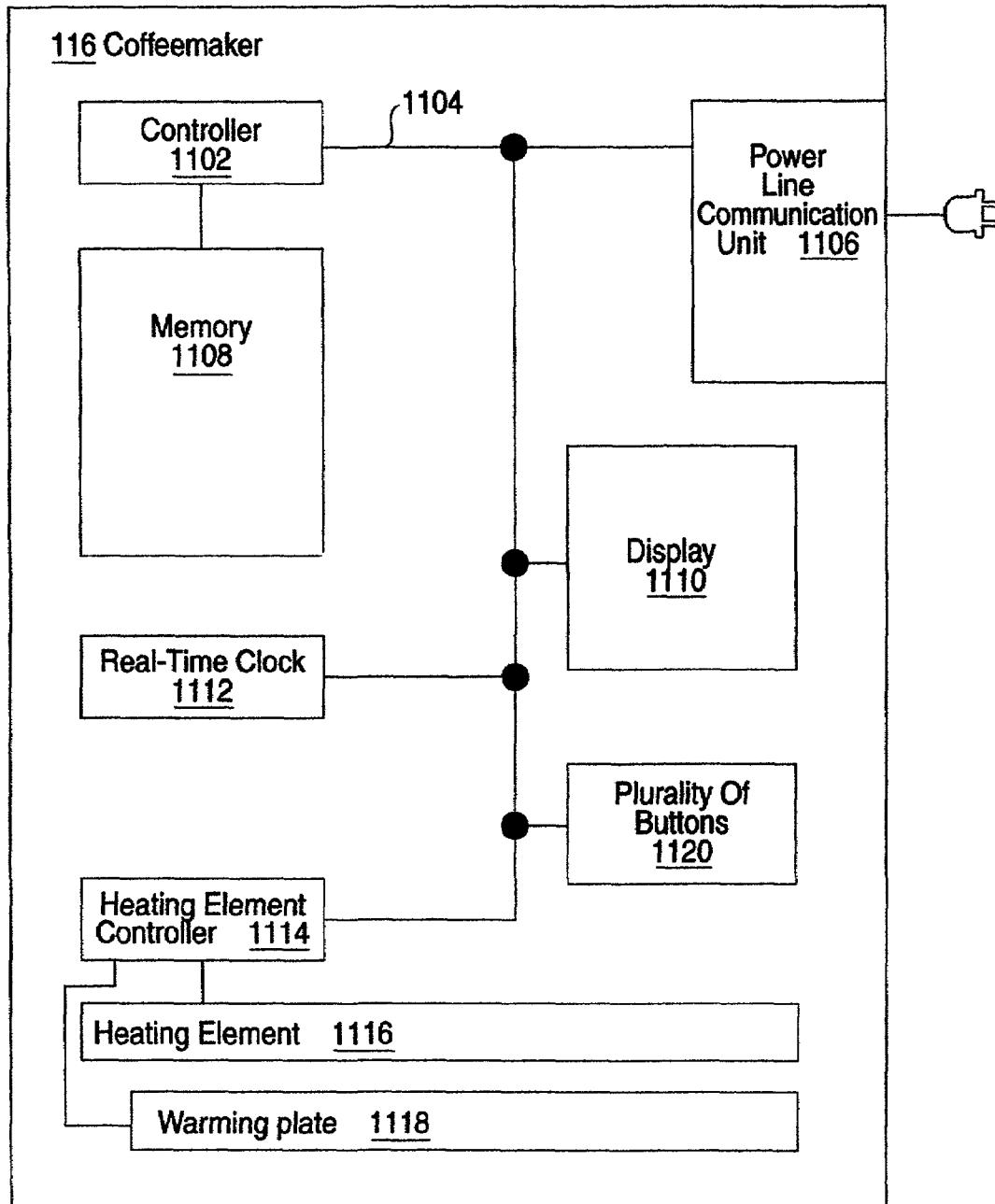


Fig. 11

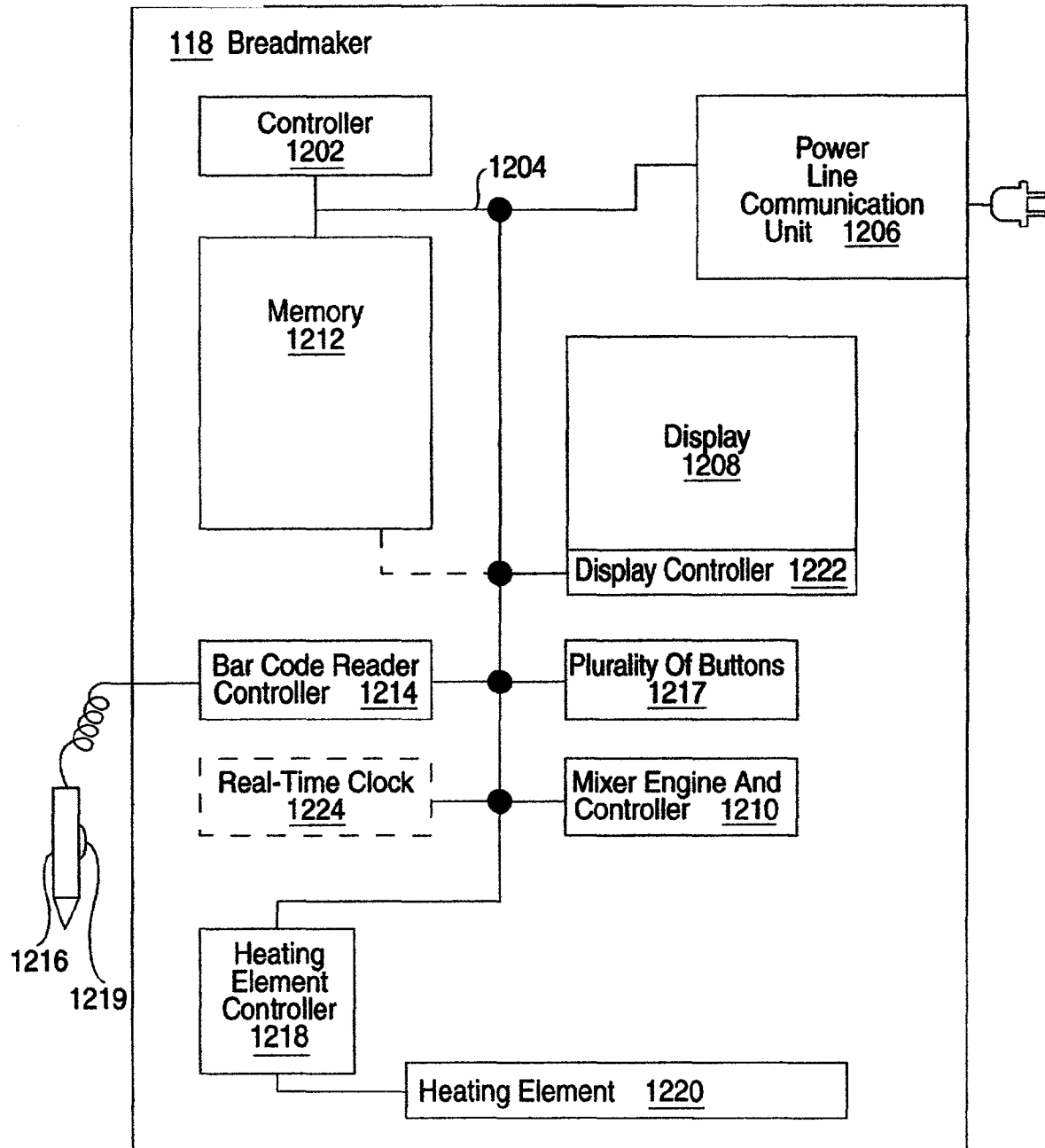


Fig. 12

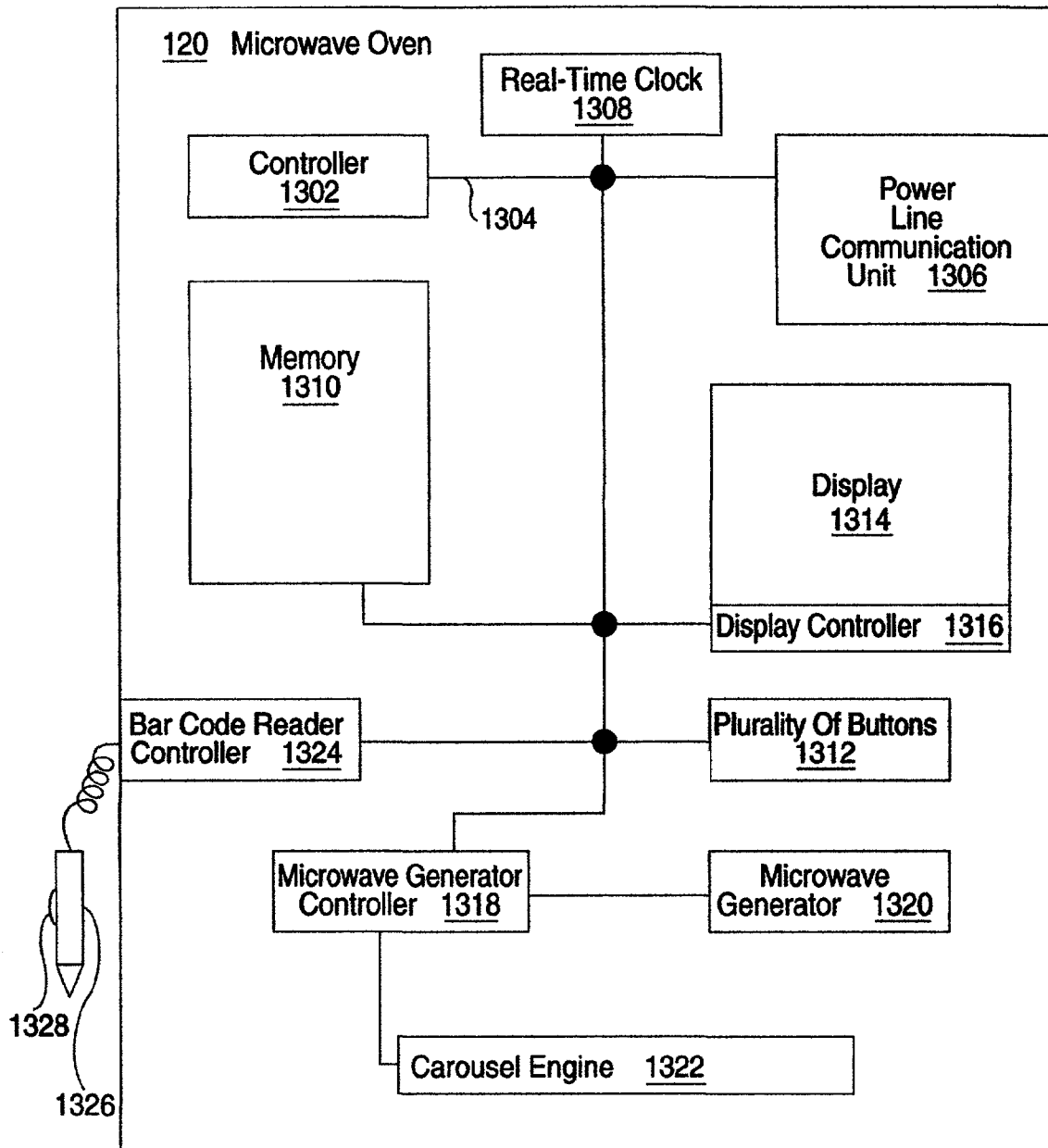


Fig. 13

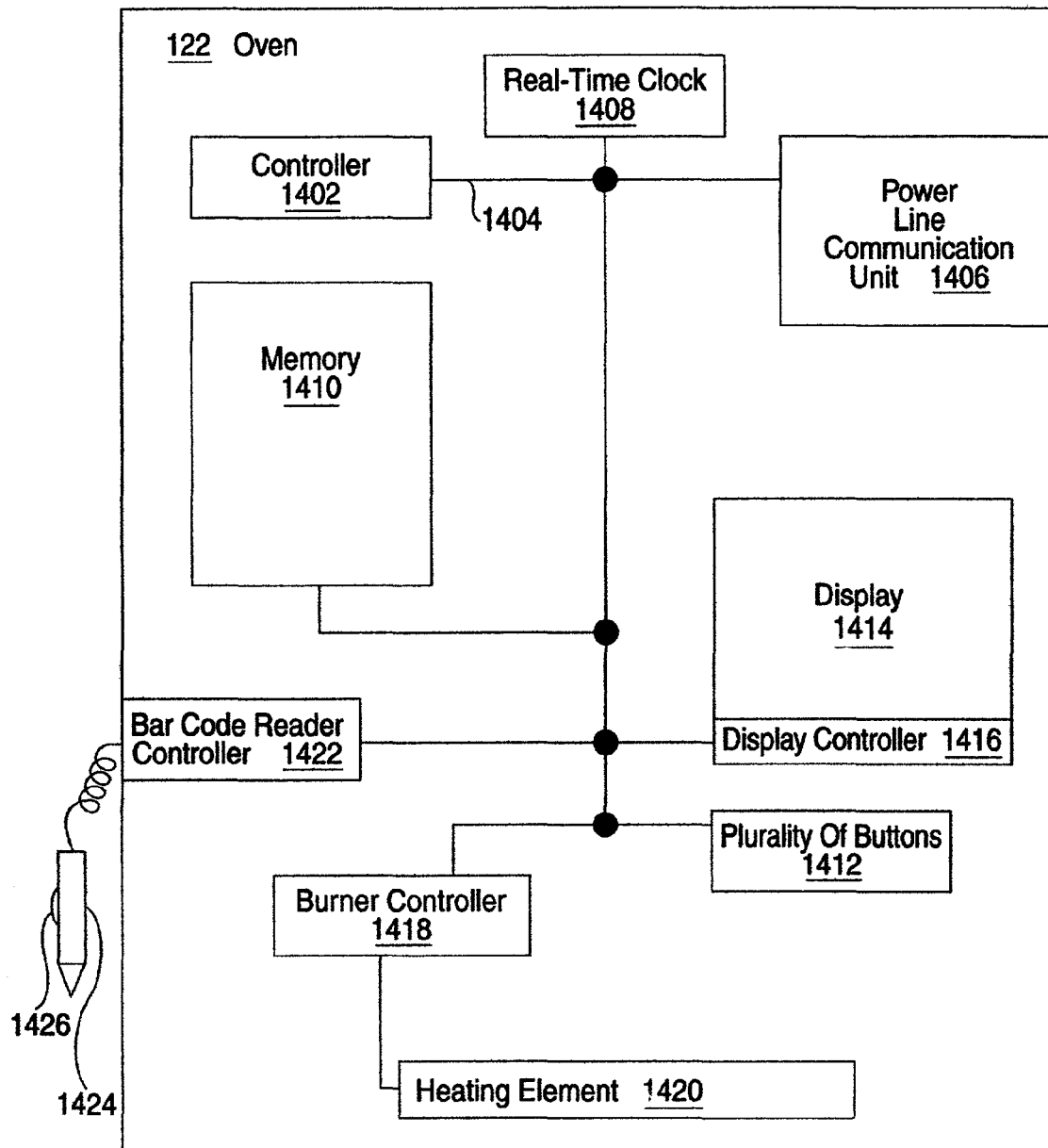


Fig. 14

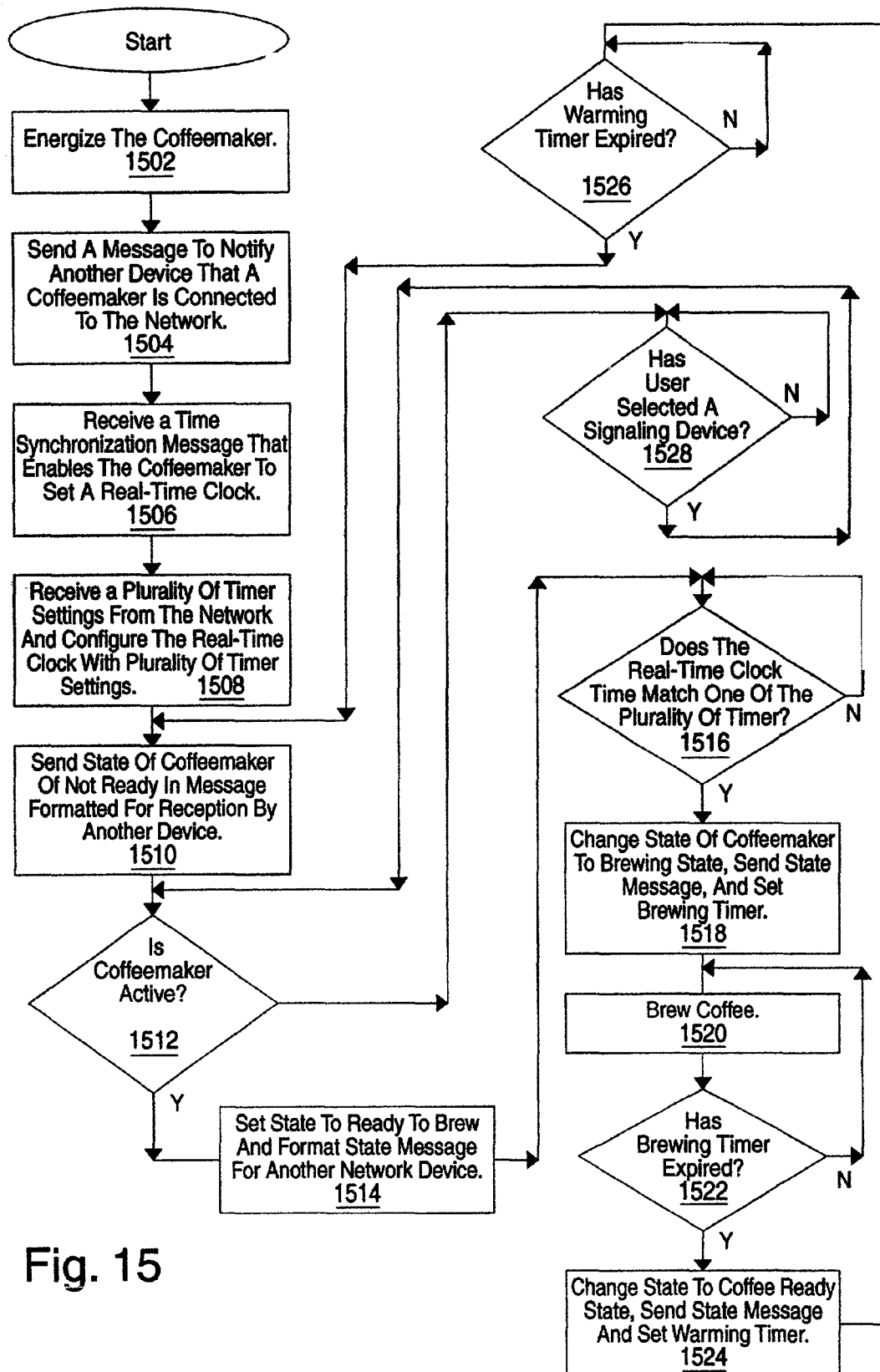


Fig. 15

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INTELLIGENT COFFEEMAKER APPLIANCE**BACKGROUND OF THE INVENTION****1. Technical Field**

The invention relates to configuration of a kitchen or household appliance network. More particularly, the invention relates to an intelligent coffeemaker that is able to communicate with and receive information from another device in a network.

2. Related Art

Currently, household appliances such as coffeemakers and ovens are independent and when used require manual programming. Some appliances, such as a coffeemaker, may be configured to have timers for turning the appliance on and off. The programming of the timers in these appliances is accomplished at the appliance using manual controls or buttons. Further, it is often impossible to change the configuration or programming of an appliance, such as the auto off timer in a coffeemaker, once the appliance has left the factory.

Another problem with household appliances is for every product cooked, such as a frozen dinner, the user must set the cooking temperature and the time. Dinners may be ruined or homes burned down because of a user erroneously setting the wrong cooking time or temperature. Prior approaches to resolving the erroneous setting problem have included cookbooks that contain bar coded instructions associated with encoded instructions for setting cooking time and temperature. Such appliances include a bar code reader to read the cookbook's bar code associated with a user-selected recipe. However, as new products are introduced in the supermarket or new recipes are created, the cookbooks must be physically updated or replaced.

Furthermore, it is not uncommon for appliances to have clocks that must be initially set and reset after a power outage. Due to the quality of the components in an appliance clock, it is rare when all clocks on respective appliances match and do not drift apart. After some period of time, the clocks on some of the appliances will have to be adjusted if a user desires all clocks to report the same time. Furthermore, clocks have to be reset twice a year in the United States for changes to or from Day Light Savings Time and may also have to be reset following a power outage.

Thus, there is a needed in the art for an approach to set cooking time and temperature that is easy to updated while enabling coordination of data between multiple appliances.

SUMMARY

An intelligent controller having a modem communicates with a remote database that has a plurality of user profiles. A user profile in the database is configurable via a device for displaying a user interface, such as a personal computer accessing the World Wide Web with web pages for an intelligent controller and other appliances. The intelligent controller receives user profile information via the modem from the database. The user profile may include, for example alarm clock settings, radio stations, and recipe programs for the appliances. A power line communication unit in the intelligent controller allows communication of data received by the modem via an external network to other appliances over a local network communication link, such as the alternating current (AC) wiring of a home, a wireless connection, or the in home telephone wires.

A clock is periodically synchronized to a time message that the web server transmits to the intelligent controller and

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distributed by the power line communication unit to appliances that are capable of receiving the power line communications. The synchronization automatically corrects for time changes and assures all clocks report the correct time.

The user profile also contains a time zone identifier that enables the clocks, including the clock in the intelligent controller, to report the proper time for a specified time zone. The intelligent controller may also have an associated radio with radio preset radio stations being programmed in the user profile and received at the intelligent controller via the modem. The radio along with the clock may function as an alarm clock radio having an alarm associated with each day of the week and each alarm being independently settable to a "buzz" or any of the programmed radio stations.

A coffeemaker having a local network communication link may be one of the networked appliances. The coffeemaker may receive time, brew time, warming time, and turn on/off time configuration information from the intelligent controller. The coffeemaker may also communicate its status to the intelligent controller allowing a user to know at a remote location if the coffeemaker needs to be set up for brewing, coffee is brewing or ready. Similarly, a breadmaker having a local network communication link, a display and bar code reader may be one of the networked appliances. The breadmaker is able to receive bread making recipe programs from the intelligent controller for storage in local memory. A user upon scanning or otherwise inputting a unique product code, such as a universal product code (UPC), provided with a package such as a bread mix or cake mix configures the cycles of the bread machine. A cycle typically includes a mixing period, dough rising period, baking period, and warming period.

A microwave oven and a non-microwave type oven (for example, gas oven, electric oven, convection oven, or Ultravection™ oven) may be among the associated other appliances within the network. Each such oven would have a local network communication link and receiving recipe information from the remote database via the intelligent controller. The recipe information is stored in their respective memories. Each oven may also have a bar code reader for reading UPCs that results in the microwave oven or heating element type oven being configured for cooking the scanned product. The user may also be guided via a display screen through the preparation of the product.

If the input unique product code is unknown (i.e. not present in the memory of the appliance), the appliance may communicate the product code to the intelligent controller. The intelligent controller could then transmit the product code to the remote database as an unidentified product code. Later, a recipe program associated with the "unknown" product code may be transmitted back to the intelligent controller for further transmission to the original reporting appliance. The original reporting appliance then saves the recipe in memory.

Other systems, methods, features and advantages of the invention will be or will become apparent to one with skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description, be within the scope of the invention, and be protected by the accompanying claims.

BRIEF DESCRIPTION OF THE FIGURES

The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the prin-

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ciples of the invention. In the figures, like reference numerals designate corresponding parts throughout the different views.

FIG. 1 is a diagram of an intelligent controller in communication with a device capable of displaying a user interface via a modem and other appliances via a local network communication link in accordance with an embodiment of the invention.

FIG. 2 is a diagram of the intelligent controller in communication with the web server and web device through a PSTN of FIG. 1.

FIG. 3 is a block diagram of the intelligent controller of FIG. 2.

FIG. 4 is a web page to select preset radio stations for the intelligent controller via the device capable of displaying a user interface of FIG. 2.

FIG. 5 is a web page to set alarms and radio station via the device capable of displaying a user interface of FIG. 2.

FIG. 6 is a web page to enter current stocks via the device capable of displaying a user interface of FIG. 2.

FIG. 7 is a web page to select pre-mix breadmaker recipe programs via the device capable of displaying a user interface of FIG. 2.

FIG. 8 is a web page to select oven recipe programs via the device capable of displaying a user interface of FIG. 2.

FIG. 9 is a web page to configure the coffeemaker settings via the device capable of displaying a user interface of FIG. 2.

FIG. 10 is a web page to select microwave recipe programs via the device capable of displaying a user interface of FIG. 2.

FIG. 11 is a block diagram of the coffeemaker with a local network communication unit of FIG. 1.

FIG. 12 is a block diagram of the breadmaker with a local network communication link of FIG. 1.

FIG. 13 is a block diagram of the microwave oven with a local network communication link of FIG. 1.

FIG. 14 is a block diagram of the oven with a local network communication link of FIG. 1.

FIG. 15 is a flow chart of an intelligent coffeemaker process in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

Reference is now made in detail to an embodiment of the present invention, an illustrative example of which is depicted in the accompanying drawings, showing an intelligent kitchen. In FIG. 1, a diagram of an intelligent controller 102 in communication with a web server 104 via a modem and other appliances by a power line communication unit is shown. In an alternate embodiment, radio frequency (RF) units may link the intelligent controller 102 and appliances 116–122 with a wireless link. In yet another embodiment, power line communication units provided a wired connection between the intelligent controller 102 and appliances 116–122 and RF units provide a second or redundant path between the intelligent controller 102 and appliances 116–122. In the alternate embodiments, the wired connection may be over CAT-3, CAT-5, or even fiber optical cables. The intelligent controller 102 may have a display 106 and control surfaces 107, such as push buttons and knobs.

The modem in the intelligent controller 102 is connected to a RJ-11 telephone jack 108. The intelligent controller 102 at periodic times uses the modem to initiate a data call through the PSTN 110 to a remote database 103. The remote database 103 contains data that is accessed by the server 104

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and sent to the device capable displaying a user interface 112. An example of a remote database 103 is a database accessed by a web server upon a web page in a web browser either requesting or entering data. A device capable of displaying a user interface 112, such as a personal computer having another modem is also connected to via an RJ-11 telephone jack 114 and connected by PSTN 110 with server 104. The web device 112 communicates with the server 104 over an Internet Protocol connection. In an alternate embodiment, the intelligent controller 102 may be connected through an internet service provider and may even use a cable modem or DSL router to connect with the internet. In yet another embodiment, a different communication protocol may be used by the device 112 to communicate with server 104.

The intelligent controller 102 is also connected to the alternating current (AC) home wiring by a power line communication unit communicating through a cord that is plugged into an AC outlet 114. The power line communication unit is able to communicate with other similarly equipped appliances such as coffeemaker 116, breadmaker 118, microwave oven 120, and conventional type oven 122. Each appliance 116–122 has an associated power line communication unit that communicates through an AC outlet 124–130 for two-way communication between the intelligent controller 102 and the appliances 116–122. Examples of power line communication units include X-10, CEBus and POWERBUS power line communication units.

The power line communications between the intelligent controller 102 and the appliances 116–122 may be used to synchronize of all of the appliance clocks with the internal clock of the intelligent controller 102. In turn, the intelligent controller 102 may have an internal clock that is periodically synchronized by communication with the remote database 103 located on server 104. In one embodiment, the remote database 103 maintains accurate time by receiving a timing signal from an atomic clock. In an alternate embodiment, a GPS clock may provide an accurate time signal to the server 104. In another embodiment, a separate time server connected to an accurate clock or GPS clock may supply time to the network.

The coffeemaker 116 receives programming for when to turn on from over the power line via the intelligent controller 102. The coffeemaker 116 may periodically and/or randomly report its state to the intelligent controller 102, where it may be displayed. If an “on” time is set, for instance, then the coffeemaker 116 may report to the intelligent controller that it is not ready to brew. Once the user places water and coffee grounds in the coffeemaker 116, the user presses a button on the coffeemaker 116 to place the coffeemaker 116 in a “ready to brew” state. Alternatively, coffeemaker 116 may have sensors to determine whether supply water and coffee grounds are available. The coffeemaker 116 having informed the intelligent controller 102 that the coffeemaker is in the “ready to brew” state then may display a ready to brew symbol in the display 110. When the programmed time occurs, the coffeemaker 116 starts to brew the coffee and may notify the intelligent controller 102 that it is in the brewing state. The intelligent controller 102 may, in turn, display a brewing symbol on its (optional) display.

When the coffeemaker finishes brewing, it may notify the intelligent controller 102 that the coffee is ready. The intelligent controller 102 then may display, a coffee is ready symbol. The coffeemaker turns off automatically after a predetermined time period. It may also be turned off manually by a user pushing an off button. In either event, the coffeemaker may inform the intelligent controller 102 of the

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state change. The intelligent controller **102** may then report via its display that the coffeemaker is not ready to brew. Thus an advantage is achieved by having the intelligent controller **102** remotely display the state of the coffeemaker **116**. Further, the time is correctly set and maintained by synchronization with the time maintained by the intelligent controller **102**.

The breadmaker **118**, microwave oven **120** and conventional oven **122** may each have a respective bar code reader **130–134**. The bar code readers enables the user of appliances **118–122** to scan a unique product code, such as the universal product code (UPC) located on a food container. Alternatively, the appliances may be equipped with control surfaces, such as push buttons or switches, that allow a user to manually input the code. This may be used to make the appliances less expensive or where a bar code reader is broken or perhaps not purchased with the appliance. The appliances **118–122** then attempt to identify a recipe program associated with the input product code. If the recipe program is found in local memory, then the appliance is configured by the execution of the recipe program. Thus, an advantage is achieved by being able to configure the appliances **118–122** for different types and manufactures of consumer food products. Further the risk of incorrectly preparing the food products is reduced because of less human interaction during the cycle programming of the appliances **118–122**.

Turning to FIG. 2, a diagram of the intelligent controller **102** in communication with the web server **104** and web device **112** through the PSTN **110** of FIG. 1 is shown. The web server **104** has a database **202** of user profiles with at least one user profile **204** associated with each intelligent controller. The user profile **204** is periodically pushed down to an associated intelligent controller **102** along with time synchronization data and updated user selected data, such as news **212**, stock prices **214** and weather reports **216**. In an alternate embodiment, time synchronization data and updated user selected data may be pulled down by the intelligent controller **102** from the web server **104**. The user selected data is sent from the web server **104** through the PSTN **110** to be received via modem **206** at the intelligent controller **102**. The controller **210** stores the user-selected data (news **212**, stock prices **214** and weather reports **216**) into memory **208**. The user selected data stored in memory **208** may then be displayed by the controller **210** on display **218** along with time information.

The user profile **204** stored in the database **202** located on the web server **104** also contains configuration data, such as time zone, user-selected preset radio stations, alarm times and settings (“buzz” or a radio station). The alarm times **220** and radio stations **221** configuration data is stored by controller **210** in memory **208** when periodically pushed down to the intelligent controller **102** from the web server **104**. Miscellaneous data, such as recipe program updates, new recipe programs, other text or programs may be received by the intelligent controller **210** and stored in memory **208** or as appropriate miscellaneous memory **223**. Data stored in memory **208** may also be transmitted to and received from other appliances through a local network communication link **220**.

The user profile **204** is configurable via a web browser **222** being executed on the web device **112** connected by an Internet Protocol connection through PSTN **110** to web server **104**. In particular, the web browser **222** accesses configuration web pages **224** that may be associated with the intelligent controller **102** and other appliances **116–122**. A time web page **226** is presented to a user of the web device

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112 that allows a user to enter the zip code where the intelligent controller **102** will be located in operation. In other embodiments the time web page **226**, may be implemented as input fields on another web page, such as a user information web page **234**. The zip code is then used by a program on the web server **104** to identify possible radio stations and time zones. In other embodiments, the user may select the time zone and city where the intelligent controller **102** is located. Further, the time web page **226** may be used to configure the clock function, set alarm web page **228**. Other web pages that may be configured include stock selection web page **230**, program radio stations web page **232**, user information web page **234**, web pages for selections of recipe programs for a oven **236**, breadmaker recipe program selection web page **238**, coffeemaker programming web page **240**, recipe program selection web page for the microwave oven **242** and recipe program selection pages for other appliances.

Each web page communicates with the web server **104** and may result in the user profile **204** in the database **202** being configured or updated. Changes in the user profile **204** are periodically transmitted between the intelligent controller **102** and the web server **104**, preferably by pushing down the data (whole user profile or just the changes in the user profile), at predetermined intervals. Thus, the ability to change or update programs associated with the user profile is achieved by downloading the changes or updates to appliances **116–122** via the intelligent controller **102**.

In an alternate embodiment, the web server **104** may contact the intelligent controller **102** and send the data contained in the user profile **204** to the intelligent controller **102** at periodic intervals. In yet another embodiment, the web server may contact the intelligent controller **102**, upon configuration of the intelligent controller **102** and/or upon a change being made to the user profile **204**. Similarly, in another alternate embodiment, the intelligent controller **102** may synchronize with the web server **104** and user profile **204** upon a predetermined action occurring. Examples of such actions include; a user physically pressing a button to cause synchronization, new appliances being detected on the power line, or receiving a “unknown unique product code” message from an appliance.

Intelligent Controller

In FIG. 3, a block diagram of the intelligent controller **102** of FIG. 2 is shown. The intelligent controller **102** has a controller **210** that is connected by a bus **302** to the modem **206**, the memory **208**, and the local network communication link **220**. The intelligent controller **102** may also include the display **218**, a radio **304**, a plurality of input controls **306**, and a real-time clock **308**. The controller **210** is preferably a microprocessor, but in an alternate embodiment may be a reduced instruction set chip (RISC) processor, micro-controller, digital circuits functioning as a controller, analog circuits functioning as a controller, a combination of analog and digital circuits functioning as a controller, or a digital signal processor.

The modem **206** is preferably a low speed 300–14,400 kbps internal modem and is a network interface to PSTN **110**. Among other potential advantages, the use of a low speed modem keeps the cost of the system lower. In an alternate embodiment, a higher speed modem or network interface may be used. In yet another alternate embodiment, an external network interface may be used to access the PSTN **110** and connect to the intelligent controller **102** via an external bus such as a serial bus, SCSI bus, or universal serial bus (USB). The modem **206** may also make a con-

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nection to the external network by wireless means, such as wireless Ethernet connection, 900 MHz in home network, or cellular connection.

The radio 304 is configurable by data received via the modem 206 by the controller 210. Such configuration information may include preset radio stations for among other available mediums both the AM and FM radio bands that are stored in memory 208. The radio 304 can be activated either by one of the plurality of input controls 306 or by the controller 210 in response to the real time clock 308. A radio signal is received by an antenna (not shown) among other available mediums such as streaming data. In an alternate embodiment, the radio 304 may included a weather alert radio in place of or in addition to the radio 304.

The display 218 is able to display text and low-resolution graphics. The display is controlled by a display controller 310 that is in communication with memory 208 and controller 210. Alternatively, display controller 310 may be integrated with controller 210 or display 218. The display 208 is a monochrome liquid crystal display (LCD). In an alternate embodiment, a high-resolution display may be used. Further, a color display may be used in yet another embodiment. In other embodiments, other types of displays that are capable of displaying data may be used, including for example cathode ray tubes and plasma displays. The display may even be a touch screen that combines the plurality of input controls 306 with display 218.

A real-time clock 308 having a oscillator is connected to the controller 210. The real-time clock 308 is a digital chip that is programmable by the controller 210 in response to a synchronization signal (time message) being received at modem 206. The real-time clock 308 is preferably only accurate enough to maintain time for a period of approximately two weeks, thus allowing for greater variances in component quality. A network indicator may be provided on the display 218, to indicate if a synchronization of real-time clock 308 has occurred within a preceding two-week period. Thus, an advantage is achieved by maintaining the correct time by synchronization of the real-time clock 308 with the correct time maintained at the web server 104. Alternatively, a more accurate real time clock could be utilized, thus reducing the need for synchronization between the real-time clock 308 and the server 104.

The memory 208 is preferably a combination of random access memory (RAM), such as dynamic random access memory (DRAM), synchronous dynamic random access memory (SDRAM), or other types of read/write memory, and of read only memory (ROM), such as programmable read only memory (PROM), electrically erasable programmable read only memory (EEPROM). In an alternate embodiment, the memory may include external semi-permanent memory, such as magnetic disk (hard disk, removable hard disk, floppy disk), optical disk (CD-RW) or external permanent memory (CD-R and DVD-R). The memory 208 is divided into a program portion that controls the operation of the intelligent controller 102 and a data portion that maintains configuration data and variables used and manipulated by the controller 210 upon execution of a program.

The local network communication link 202 transmits a carrier signal that is capable of transporting data between the intelligent controller 102 and devices over a communication link. In a preferred embodiment, local network communication link 202 is a power line communication transceiver that sends and receives signals over a home's AC wiring that electrical appliances receive power. Thus, the power line communication unit is shown both a power supply for the

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intelligent controller 102 and a communication unit that enables two-way communication with other appliances that share the AC wiring, but may be implemented separately. Examples of such power line communication approaches include; X-10, CEBUS, and POWERBUS by Domosys Corp. In an alternate embodiment, the power line communication unit 202 may be replaced with a wireless RF unit that establishes a wireless connection between the intelligent controller 102 and other appliances.

The minimum functionality required in the intelligent controller 102 is to convert data received over an external network to the internal network enabling communication between the internal network and the external network. The communication path to the external network (e.g. Internet) is often costly to keep active and requires telephone resources that are only periodically available in a home. Therefore, the intelligent controller 102 acts as a temporary storage unit in the transmission of data. For example, if an appliance scans a product code that is unknown to that appliance, a message is sent to the intelligent controller 102 for future transmission to the web server 104 upon synchronization. Additional functionality is added to the intelligent controller 102 for the convenience of the user, such as the display 218, radio 304 and clock 308 with a human perceptible time indicator such as display 218, tones, synthesized voice, light emitting diodes forming a display).

Another slave intelligent controller (not shown) may be in communication with the intelligent controller 102 and act as a second input/display device. The slave intelligent controller has a controller, display, memory, power line communication unit, and plurality of control surfaces. In such a system, information displayed on the intelligent controller 102 is mirrored on the slave intelligent controller. The plurality of buttons 306 on intelligent controller 102 is also mirrored on the slave intelligent controller. Thus, a person may have one intelligent controller 102 and a plurality of slave intelligent controllers in different rooms of a home. Further, the slave intelligent controller may contain another radio that is separately programmable from the radio in the master intelligent controller. Similarly, the slave intelligent controller may have an alarm clock that is separately programmable from the alarm clock in the master intelligent controller. In another embodiment, the intelligent controller 102 does not have a display 218 or plurality of button 306, rather the intelligent controller 102 relays the information to be displayed to all the displays on the slave intelligent controller and receives input from the plurality of button on the slave intelligent controllers.

Configuration Web Pages

A remote computer may function as the device capable of displaying a user interface 112. The remote computer is likely a general-purpose computer system such as an IBM compatible, Apple, or other equivalent computer (using a processor that may selectively be an Intel, AMD, Cyrix, Motorola 68XXX or PowerPC series, Compaq Digital Alpha, Sun, HP, IBM, Silicon Graphics, or other type of equivalent processor) that, among other functions, allow a user to communicate with server 104 via an external network, such as the PSTN network. The network is any network that allows multiple computer systems to communicate with each other such as a Local Area Network (LAN), Storage Area Network (SAN), Wide Area Network (WAN) alternative Intranet, Extranet, or the Internet. Server 104 is preferably a general-purpose computer system such as an IBM compatible, Apple, Unix type workstation, or equivalent computer (using a processor that may selectively be an Intel,

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AMD, Cyrix, Motorola 68XXX or PowerPC series, Compaq Digital Alpha, Sun, HP, IBM, Silicon Graphics, or other type of equivalent processor) that may generate a user interface, responds to commands, and communicates with server **104**. Of course, the device **112** and server **104** need not be the same type of general-purpose computer. Both remote computer and server **104** preferably contain a network interface that allows for communication via a network. Network interfaces may selectively include hardware and any software capable of communicating with the network. Examples of the software would be any LAN, WAN, SAN, alternative Intranet, Ethernet capable or Internet compatible software program such as Novell, Windows, Unix, Netscape Navigator, Microsoft Internet Explorer, Mosaic, UP.BROWSER, or similar. It should also be noted that the network could comprise the public telephone network with server **104** acting as a dial-up bulletin board and remote computer dialing in directly to server **104** via the telco network.

Using a remote computer to operably connect to server **104**—in a well-known manner dependent upon the technology of network—the user will access the home page of web pages, and thus access to the various functions of the server **104** would be made via hyperlinks. Of course, while the present disclosure is being made in a HTML-type environment, use of this environment is not required as part of the present invention. Other programming languages and user-interface approaches may also be used to facilitate data entry and execute the various computer programs that make up the present invention.

Information may be entered into the user interface for entry into a database **202** residing on the server **104**. The information may be input in conjunction with a variety of computer data entry techniques. In some instances, the information may be type-checked (i.e. character, integer, date, etc.), limited by “lookup table” constraints or completely freeform. A user enters a user identifier and the serial number of the intelligent controller **102** into a web page. Upon actuation of the submit button (or similar action), the information entered in the different web pages populates the database entry (not shown) for each user. For new members this process may further involve the creation of a new database record. As a result, server **104** (or another general purpose computer or file server operably associated with server **104**) stores the records in the database, the computer programming methods and procedures for which are well-known to those of ordinary skill in the art.

In FIG. 4, an example web page to select radio stations **232** at the web device of FIG. 2 is shown. A user of the device capable of displaying a user interface **112** accesses the server **104** and a user profile associated with the intelligent controller **102**. The user supplies information relating to the operating location of the intelligent controller **102** such as a zip code or enters time zone information in a time web page **226** and is then presented with other configuration web pages **224**. The server **104** sends a web page **232** to the device **112** for selection of the preset radio stations. In a preferred embodiment, the web page identifies the available radio stations **404** by their frequency **406**, call sign **408**, city **410**, and state **412**. The user then selects **414** which of the stations should be pre-selected by placing a check in a box **416** associated with the desired station. The web page may also display the radio stations that have already been selected **418**. As would be understood by those familiar with graphical user interface design, the particular placement of elements and user input techniques could be modified in view of this present disclosure without departing from the scope of the invention. Upon completion, the web page is

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transmitted to the web server **104** for processing and placement of the data into the users profile **204**.

Turning to FIG. 5, an example web page to set alarms and radio station **226** at the web device **112** of FIG. 2 is shown. In this preferred approach, the user is shown the day of week **502** and is presented an input field for selected “on time” **504**. If the intelligent controller includes a radio, then the alarm may have a wake-up station **506** set to a default “buzz” (i.e. no station) or may be set to one of the radio station presets using a page similar to that of FIG. 4. Further, the user would then activate selected alarms by indicating in an input field **508** that the alarm is to be active. The user is able to review the current alarm settings by viewing the current alarm display **508** that is present on the web page **226**. The changes that have just been made by a user may not be reflected in the current alarm display **508** until the alarm schedule is updated. Upon completion, the alarm schedule is updated and the data is transmitted to the web server **104** for processing and placement into the users profile **204**.

In FIG. 6, an example web page **230** to enter current stocks **230** at the web device **112** of FIG. 2 is shown. A user may select the web page **230** to select stocks for inclusion in a portfolio tracker. The user is then presented with his current portfolio (initially empty) that includes stock symbols **606**, company names **608** and the number of shares **610**. The user is also presented with the options of selecting other web pages such as “Update Your Portfolio” **602** or “Add to Your Portfolio” **604**. “Updating Your Portfolio” **602** enables a user to access a web page with input boxes for the number of shares. “Add to Your Portfolio” **604** accesses a web page for adding or deleting stocks from the portfolio. Upon completion, the data from web page **230** is transmitted to the web server **104** for processing and placement into the users profile **204**.

Turning to FIG. 7 an example web page **238** to select pre-mix breadmaker recipe programs at the device **112** of FIG. 2 is shown. The page may be made inaccessible to users who have not purchased an intelligent breadmaker **118**. A user accesses the web page **238** from the web server **104** and selects the pre-mixed bread recipe programs that user desires to have downloaded to the breadmaker **118**. Of course, it should be understood that the recipe programs shown are by way of example and not intended to limit the invention. The name of the pre-mixed bread **702** is displayed along with an associated unique product codes, such as UPC **704**. The user selects a pre-mixed bread recipe program **706** by placing a mark in an input box **708**. The memory limitation of the breadmaker is reflected by the number of pre-mix bread recipe programs that may be selected and ultimately downloaded, twenty in the present example. In an alternate embodiment, more recipes may be downloaded if more memory is available or if compression techniques are used. In yet other embodiments, the selection of recipe programs occurs over time automatically with a predetermined number of the most recent used recipe programs being selected. The current selected pre-mix bread recipe programs will be displayed on web page **238** with checks in the selection input field **706**. Upon completion, the web page **238** is transmitted to the web server **104** for processing and placement of the data into the user’s user profile **204**.

In FIG. 8, an example web page **236** to select oven recipe programs at the web device **112** of FIG. 2 is shown. The page may be made inaccessible to users who have not purchased an intelligent oven. A user accesses the web page **236** from the web server **104** and selects the oven recipe programs that the user desires to have downloaded to the oven. The names of the oven recipe programs **802** are displayed along with an

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associated UPC **804**. The user selects a oven recipe program **806** by placing a mark in an input box **808**. The memory limitation of the oven is reflected by the number of oven recipe programs that may be selected and downloaded, 20 recipe programs in the present example. In an alternate embodiment, more recipe programs may be downloaded if more memory is available or if compression techniques are used. In yet other embodiments, the selection of recipe programs occurs over time with a predetermined number of the most recent recipe programs being selected. The current selected oven recipe programs will be displayed on the web page **236** with checks in the selection input field **806**. Upon completion, the data from web page **236** is transmitted to the web server **104** for processing and placement into the users profile **204**.

Turning to FIG. **9**, an example web page **240** to configure the coffeemaker settings at the web device **112** of FIG. **2** is shown. The page may be made inaccessible to users who have not purchased an intelligent coffeemaker. Upon accessing the web page **240** to configure the coffeemaker settings, the user is presented with a schedule for each day of the week **902**. The user is shown the current "On Time" **904** and "Off Time" **906**. The user is able to change the "On Time" **904** or "Off Time" **906** by accessing the appropriate input box **908** and **910** for example. The user is also shown the current brew schedule **912** for the coffeemaker. The brew schedule is updated by selection "Update Brew Schedule" **914** and the data is updated in the user profile **204** located in the database **202** located at the web server **104**. Although the example of FIG. **9** shows only one setting per day of the week, it is contemplated that any or all days could have a plurality of "On Times" and "Off Times".

In FIG. **10**, an example web page **242** to select microwave recipe programs at the web device **112** of FIG. **2** is shown. The page may be made inaccessible to users who have not purchased an intelligent microwave oven. A user accesses the web page **242** from the web server **104** and selects the microwave oven recipe programs to be downloaded to the oven. The name of the microwave oven recipe program **1002** is displayed along with an associated with a unique product code, such as UPC **1004**. The user selects a microwave oven recipe program **1006** by placing a mark in an input box **1008**. The memory limitation of the microwave oven is reflected by the number of microwave oven recipe programs that may be selected and downloaded, twenty in the present example. In an alternate embodiment, more recipe programs may be downloaded if more memory is available or if compression techniques are used. In yet other embodiments, the selection of recipes occurs over time with a predetermined number of the most recent used recipe programs being selected. The current selected oven recipe programs will be displayed on the web page **236** with checks in the selection input field **1006**. Upon completion, the data from web page **242** is transmitted to the web server **104** for processing and placement into the users profile **204**.

Coffeemaker

FIG. **11** is a block diagram of the coffeemaker **116** (also shown in FIG. **1**) with a local network communication link **1106** of FIG. **1**. In the preferred embodiment, **1106** is a power line communication unit. The coffeemaker **116** includes a controller **1102** that is operably connected to a bus **1104** that enables communication with a local network communication unit **1106**, memory **1108**, display **1110**, a real-time clock **1112**, and a heating element controller **1114**. The heating element controller **1114** is able to electrically control the heating element **1116** and warming plate **1118**. A

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plurality of buttons **1120**, may also be present and in communication with the controller **1102** to enable manual configuration/operation of the coffeemaker **116**.

The controller **1102** is a preferably a microprocessor. In an alternate embodiment controller **1102** may be a reduced instruction set chip (RISC) processor, micro-controller, digital circuits functioning as a controller, analog circuits functioning as a controller, a combination of analog and digital circuits functioning as a controller, or a digital signal processor.

The display **1110** is a light emitting diode display and is able to display numbers (time) and human perceptible indicators such as graphics, text, light emitting diodes, light bulbs, audio signal, or even mechanical signal (i.e. flags or arms that are raised and lowered). The indicators indicate among other possibilities when the coffeemaker **116** is on, programmed, ready to brew, brewing, and coffee ready. In an alternate embodiment, the display **1110** may be a liquid crystal non-color display. In yet another alternate embodiment, a high-resolution display may be used. Further, a color display may be used in yet another embodiment. The display may even be a touch screen display that combines the plurality of buttons **1120** with display **1110** in an additional embodiment.

The local network communication unit **1106** is a unit that transmits a carrier signal that is capable of transporting data between devices over the traditional home AC wiring that electrical appliances receive power from. Thus, the local network communication unit **1106** is shown as both a power supply for the coffeemaker **116** and a communication unit that enables two-way communication with the intelligent controller **102** that share the AC wiring. Examples of such power line communication approaches include; X-10, CEBUS, and POWERBUS by Domosys Corp. Of course, other local network interfaces could alternatively be substituted, such as wireless, cellular and telephone line network interface.

The memory **1108** is preferably a combination of random access memory (RAM), such as dynamic random access memory (DRAMs), synchronous dynamic random access memory (SDRAMs), or other types of read/write memory, and of read only memory (ROM), such as programmable read only memory (PROM), electrically erasable programmable read only memory (EEPROM). In an alternate embodiment, the memory may include external semi-permanent memory, such as magnetic disk (hard disk, removable hard disk, floppy disk), optical disk (CD-RW) or external permanent memory (CD-R and DVD-R). The memory is **1108** is divided into a program portion that controls the operation of the coffeemaker **116** and a data portion that maintains configuration data and variables used and manipulated by the controller **1102** upon execution of a program.

In manual operation, the user may set the real-time clock **1112** of the coffeemaker via the plurality of buttons **1120**. The coffeemaker may be turned on or off by one of the plurality of buttons **1120**. Once turned on, controller **1102** in the coffeemaker **116** will instruct the heating element controller **1114** to automatically turn off the heating elements after a short period of time (after coffee is made). After two hours, the controller **1102** will automatically instruct the heating element controller **1114** to turn off the warming plate **1118**. The controller **1102** is aware of elapsed time by setting timers in the real-time clock **1112**.

The coffeemaker **116** may also alternatively be configured from the intelligent controller **102** and web device **104**. The intelligent controller **102** detects the presence of coffee-

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maker 116 when the coffeemaker 116 broadcasts a message via the local network communication unit 1106 upon the coffeemaker 116 being energized (plugged-in to the outlet 124). In an alternate embodiment, the intelligent controller 102 periodically checks for new appliances, by broadcasting a message to all appliances connected either to the power line network or by periodically searching for specific types of appliances, such as coffeemaker 116. In yet another embodiment, registration occurs at a web page displayed on the web device 104 that enables the user to enter information into a user profile 204, such as selecting an input box associated with the coffeemaker or a serial number, that is downloaded to the intelligent controller 102.

In one potential embodiment, the controller 1102 communicating with the intelligent controller 102 via local network communication unit 1106, results in an indicator appearing in the display 1110 to show network communication has been established. The indicator may occur after a time message has been received by the controller 1102 and real-time clock 1112 has been set. The indicator will stay lit for a predetermined indicator time even if communication with the intelligent controller 102 is lost. After that predetermined indicator time, the "network link established" indicator will be deactivated and no longer visible on the display 1110. In an alternate embodiment, the indicator will be deactivated upon the controller 1102 losing communication via the local network communication unit 1106 with the intelligent controller.

The controller 1102 in the coffeemaker 116 may periodically receive time messages from the intelligent controller 102 over the local communication network that results in the controller 1102 setting the real-time clock 1112. In an alternate embodiment, the controller 1102 receives a specific time message that is transmitted only to the coffeemaker 116. In yet another embodiment, the controller 1102 requests a time message from the intelligent controller via the local network communication unit 1106 when power is initially applied to the coffeemaker 116 or restored after a power outage.

The controller 1102 receives programming information from the intelligent controller 102 via the local network communication unit 1106. The intelligent controller in turn has obtained the information from the user profile data entered on the coffeemaker web page 240. The programming of the coffeemaker 116 is by day of week, but in an alternate embodiment may be configurable for multiple time events (multiple times a day, just not once a day). When the coffeemaker 116 is programmed to turn on, the controller 1102 preferably stores the information in memory and sets an event to trigger in the real-time clock 1112. Because this is local to the coffeemaker, once set even if network connection is lost, the coffeemaker 116 can go on. The display 1110 activates a timer indicator to show the coffeemaker 116 has been programmed. At each programmed day and time, the controller 1102 is notified of the event by real-time clock 1112 and notifies the heating element controller 1114 to turn on the heating element 1116 and warming plate 1118. After a preset time, the heating element controller 1114 turns off the heating element 1116 and the coffee is kept hot by the warming plate 1118. During the coffee making operation, the controller 1102 activates an "on" indicator in display 1110. When the heating element controller 1114 turns off the heating element 1116, the controller activates a "ready" display on display 1110.

Preferably, the controller 1102 sends messages via the local network communication unit 1106 to the intelligent controller 102 when the state of the coffeemaker 116

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changes. When the coffeemaker 116 is programmed with times for turning on, the controller 1102 may send a message indicating that the coffeemaker is not ready to brew to the intelligent controller 102. A user prepares the coffeemaker 116 by placing water and coffee grounds in the coffeemaker 116 and by pressing one of the plurality of buttons 1120 to activate the coffeemaker 116. The controller 1102 may send a message to the intelligent controller that the coffeemaker 116 has been activated. When the programmed time occurs, the coffeemaker 116 is turned on and the coffee starts to brew. The controller 1102 then sends a message to the intelligent controller 102 signifying that the coffee is brewing. When brewing is complete, the controller 1102 notifies the intelligent controller 102 by sending a message via the local network communication unit 1106.

After the predetermined hold time (generally two hours) about two hours, the heating element controller 1114 is notified over bus 1104 by the controller 1102 to turn off (auto off) the warming plate 1118. The controller 1102 also deactivates the "on" indicator and the "ready" indicator in display 1110. The controller 1102 also send a message to the intelligent controller 102 to inform the intelligent controller 102 that the coffeemaker 116 is again in the not ready to brew. In an alternate embodiment, the period of time for auto off may be set at a web page and stored in the user profile 204 for downloading to the coffeemaker 116 via the intelligent controller 102.

Breadmaker

Examining FIG. 12, a block diagram of the breadmaker 118 with a local network communication link 1206 of FIG. 1 is shown. Local network communication unit 1206 is preferably a power line communication unit. A controller 1202 is operably connected by a bus 204 with the power line communication unit 1206, display 1208, mixer engine and controller 1210, memory 1212, an optional product input device such as a bar code reader controller 1214 having a bar code reader 1216, plurality of buttons 1217 and heating element controller 1218. The heating element controller 1218 is connected to heating element 1220 and controls the cycling of the heating element and heat applied to baking dough. The display 1208 is controlled by a display controller 1222 and converts the messages received from the controller 1202 into human perceptible graphics, such as symbols and letters to form words.

The controller 1202 is preferably a microprocessor. In an alternate embodiment, controller 1202 may be a reduced instruction set chip (RISC) processor, micro-controller, digital circuits functioning as a controller, analog circuits functioning as a controller, a combination of analog and digital circuits functioning as a controller, or a digital signal processor.

The display 1208 may be preferably able to display text and low-resolution graphics. The display is controlled by a display controller 1222 that is in communication with memory 1212 and controller 1202. The display 1208 is a liquid crystal non-color display. In an alternate embodiment, a high-resolution display may be used. Further, a color display may be used in yet another embodiment. Even through a LCD display has been used with the preferred embodiment, any other types of displays that are capable of displaying data may be used, including cathode ray tubes and plasma displays. The display may even be a touch screen that combines the plurality of buttons 1217 with display 1208.

The power line communication unit 1206 is a unit that transmits a carrier signal that is capable of transporting data

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between devices over the traditional home AC wiring that electrical appliances receive power from. Thus, the power line communication unit **1206** is shown as both a power supply for the breadmaker **118** and a communication unit that enables two-way communication with the intelligent controller **102** that share the AC wiring. Examples of such power line communication approaches include; X-10, CEBUS, and POWERBUS by Domosys Corp. Of course other local network interfaces could alternatively be used.

The local network communication unit **1206** enables two-way communication from an appliance to another device and the exchange of data including recipe programs and time synchronization messages. The two-way communication preferably does not occur over a continuous communication path, rather communication occurs between the appliance and the intelligent controller **102** and then between the intelligent controller **102** and the server **104**. Similarly, communication may occur between the server **104** and the intelligent controller **102**, and then between the intelligent controller **102** and appliances. In alternate embodiments, a communication may be established between the appliance and the server **104** through the intelligent controller **102**.

The memory **1212** is a combination of random access memory (RAM), such as dynamic random access memory (DRAM), synchronous dynamic random access memory (SDRAM), or other types of read/write memory, and of read only memory (ROM), such as programmable read only memory (PROM), electrically erasable programmable read only memory (EEPROM). In an alternate embodiment, the memory may include external semi-permanent memory, such as magnetic disk (hard disk, removable hard disk, floppy disk), optical disk (CD-RW) or external permanent memory (CD-R and DVD-R). The memory is **1212** is divided into a program portion that controls the operation of the breadmaker **118** and a data portion that maintains configuration data and variables used and manipulated by the controller **1202** upon execution of a program.

In manual operation, the user may set select the bread type and crust darkness using the plurality of buttons **1217**. The breadmaker may be turned on or off by one of the plurality of buttons **1217**. Once turned on, controller **1202** in the breadmaker **118** executes a default breadmaking recipe program in memory **1212** that instructs the mixer engine and controller **1210** heating element controller **1218** to start the bread making process that finishes upon the executed default breadmaking program ending.

The breadmaker may alternatively be configured from the intelligent controller **102** and device **104**. The intelligent controller **102** detects the presence of breadmaker **118** when the breadmaker **118** broadcasts a message via the power line communication unit **1206** upon being plugged-in to the outlet **126**. In an alternate embodiment, the intelligent controller **102** periodically checks for new appliances, by broadcasting a message to all appliances connected either to the power line network or by periodically searching for specific types of appliances, such as breadmaker **118**. In yet another embodiment, registration occurs at a web page displayed on the web device **104** that enables the user to enter information into a user profile **204**, such as selecting an input box associated with the breadmaker **118** or a serial number, that is downloaded to the intelligent controller **102**. The breadmaker **118** may also provide some indication of network connection.

The registered breadmaker **118** receives bread making recipe programs from the intelligent controller **102** via the local network communication unit. The intelligent controller

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in turn has obtained the information from the data previously selected via web page **238**. Each of the bread making recipe programs contain a set of instructions for the controller **1202** that control the cycles of the breadmaker **118**. If no bread making recipe programs are selected, the breadmaker **118** loads default bread making recipe programs from the user profile **204** via the intelligent controller **102**. The bread making recipe program from memory **1212** may preferably be selected by scanning a UPC symbol on a pre-mix bread making package using bar code reader **1216**. In one preferred embodiment, the bar code reader **1216** is shaped like a pen and activates by pressing button **1219**. An audible signal is generated upon the successful scanning of a unique product code, such as a UPC symbol when button **1219** is activated.

The bar code reader controller **1214** receives the read UPC symbol from the bar code reader **1216** and converts the bar code symbol into digital data that is read by the controller **1202** over bus **1204**. In other embodiments, other types of input may be used for identifying a unique product code, including punch cards, magnetic encoded information (e.g. magnetic strips), keypad entry or other manual entry. The controller **1202** then identifies if one of the bread making recipe program in memory is associated with the digital data received from the bar code reader controller **1214**.

Upon identifying the bread making recipe program, the controller **1202** then starts to execute the selected bread making recipe program. Directions for using the pre-mix bread recipe are displayed on display **1208** via display controller **1222**. The controller **1202** executing the bread making recipe program initiates each cycle by instructing the mixer engine and controller **1210** along with heating element controller **1218** as to when to turn on and off, and heating temperature (warm to raise dough 90 degrees, hot 350 degrees to bake, and warm 90 degrees to keep bread warm).

During execution of the bread making recipe program, the breadmaker **118** may count down and display the minutes remaining until the bread is done. In this preferred approach, the controller **1202** sets a counter that is decrements to track passing of time. In an alternate embodiment, a real-time clock **1224** may be in communication with controller **1202**. The real-time clock **1224** receives time messages from the information controller **102**, periodically. The real-time clock **1224** then synchronizes to the time maintained by the intelligent controller **102**. The real-time clock **1224** functions in similar fashion to the real-time clock **1112** in coffeemaker **116**.

If a unique product code that was scanned or otherwise entered into the system is not found in memory **1212** by controller **1202**, then the display controller **1222** is instructed by the controller **1202** to display "Not in Memory" on display **1208**. The user manually selects the bread making recipe program to be used with the pre-mix bread. In an alternate embodiment, a default bread making recipe program is used with the pre-mix bread when the UPC that was scanned is not found in memory **1212**. An unknown UPC message is formatted by the controller **1202** containing the unknown UPC a sent via the power line communication unit **1206** to the intelligent controller **102**. Upon the next synchronization between the database **202** and the intelligent controller **102**, the unknown UPC is sent to the web source **104**. If the database **202** has a bread making recipe program associated with the unknown UPC, then the user profile **204** is updated with the bread making

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recipe program and scheduled for download to the intelligent controller **102** upon next synchronization.

In an alternate embodiment, the receipt of an unknown product code message by the intelligent controller **102** results in an immediate synchronization with the web database **202**. If the product code is not be found in the database, then the user profile **204** is updated with the UPC as a continuing request for a predetermined period (i.e. one month with a maximum limit of twenty unique product codes). If the bread making recipe program becomes available during the continuing request predetermined period, then the bread making recipe program sent to the bread-maker **118** via the intelligent controller **102** over the local network.

Microwave Oven

FIG. **13** is a block diagram of the microwave oven **120** with a local network communication unit **1306** of FIG. **1**. Local network communication unit **1306** is preferably a power line communication unit. In the microwave oven **120**, a controller **1302** is operably connected via a bus **1304** to the power line communication unit **1306**, a real-time clock **1308**, a memory **1310**, a plurality of buttons **1312**, a display **1314** via a display controller **1316**, a microwave generator controller **1318**, and a product code input controller unit, such as a bar code reader controller **1324**. Examples of other types of product code inputs include magnetic media, punch cards, and keypads. The microwave generator controller **1318** controls and is coupled to the microwave generator **1320** and a carousel engine **1322**.

The controller **1302** is preferably a microprocessor. In an alternate embodiment, controller **1302** may be a reduced instruction set chip (RISC) processor, micro-controller, digital circuits functioning as a controller, analog circuits functioning as a controller, a combination of analog and digital circuits functioning as a controller, or a digital signal processor.

The display **1314** is preferably able to display text and low-resolution graphics. The display is controlled by a display controller **1316** that is in communication with memory **1310** and controller **1302**. The display **1314** may be a liquid crystal non-color display. In an alternate embodiment, a high-resolution display may be used. Further, a color display may be used in yet another embodiment. Even through a LCD display has been used with the preferred embodiment, any other types of displays that are capable of displaying data may be used, including cathode ray tubes and plasma displays. The display may even be a touch screen that combines the plurality of buttons **1312** with display **1314**.

The power line communication unit **1306** is a unit that transmits a carrier signal that is capable of transporting data between devices over the traditional home AC wiring that electrical appliances receive power from. Thus, the power line communication unit **1306** is shown as both a power supply for the microwave oven **120** and a communication unit that enables two-way communication with the intelligent controller **102** that share the AC wiring. Examples of such power line communication approaches include; X-10, CEBUS, and POWERBUS by Domosys Corp. Of course other local network interfaces could alternatively be used.

The power line communication unit **1306** enables two-way communication from an appliance to another device and the exchange of data including recipe programs and time synchronization messages. The two-way communication preferably does not occur over a continuous communication path, rather communication occurs between the appliance

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and the intelligent controller **102** and then between the intelligent controller **102** and the server **104**. Similarly, communication may occur between the server **104** and the intelligent controller **102**, and then between the intelligent controller **102** and appliances. In alternate embodiments, a communication may be established between the appliance and the server **104** through the intelligent controller **102**.

The memory **1310** is a combination of random access memory (RAM), such as dynamic random access memory (DRAM), synchronous dynamic random access memory (SDRAM), or other types of read/write memory, and of read only memory (ROM), such as programmable read only memory (PROM), electrically erasable programmable read only memory (EEPROM). In an alternate embodiment, the memory may include external semi-permanent memory, such as magnetic disk (hard disk, removable hard disk, floppy disk), optical disk (CD-RW) or external permanent memory (CD-R and DVD-R). The memory **1310** is divided into a program portion that controls the operation of the microwave oven **120** and a data portion that maintains configuration data and variables used and manipulated by the controller **1302** upon execution of a program.

In manual operation, the user may set time and power level or energy setting of the microwave oven **120** using the plurality of buttons **1312**. The microwave oven may be turned on or off by one of the plurality of buttons **1312** and will not start until the cooking chamber containing the carousel is closed. Once turned on, controller **1302** in the microwave oven **120** is activated at the set power level for the time period set by the user. The microwave generator controller **1318** start the oven cooking process that finishes upon the expiration of the time period set by the user. The microwave generator controller activates the microwave generator **1302** that results in high frequency electromagnetic signals that heat items placed in the cooking chamber. The microwave generator controller **1318** also activates the carousel engine **1322** that is connected to a turntable that rotates items in the cooking chamber and results in a more even distribution of the high frequency electromagnetic signals. Similarly, the real-time clock **1308** that generates the time that is displayed in display **1314** may be manually set using the plurality of buttons **1312**.

The microwave oven may alternatively be configured from the intelligent controller **102** and device **104**. The intelligent controller **102** detects the presence of microwave oven **120** when the microwave oven **120** broadcasts a message via the power line communication unit **1306** upon being plugged-in to the outlet **128**. In an alternate embodiment, the intelligent controller **102** periodically checks for new appliances, by broadcasting a message to all appliances connected either to the power line network or by periodically searching for specific types of appliances, such as microwave oven **120**. In yet another embodiment, registration occurs at a web page displayed on the web device **104** that enables the user to enter information into a user profile **204**, such as selecting an input box associated with the microwave oven **120** or a serial number, that is downloaded to the intelligent controller **102**. The microwave oven may also provide some indication of network connection.

The registered microwave oven **120** receives microwave oven recipe programs from the intelligent controller **102** via the local network communication link. The intelligent controller in turn has obtained the information from the data previously selected via web page **242**. If no microwave oven recipe programs are selected, the microwave oven **120** is loaded from defaults microwave oven recipe programs from the user profile **204** via the intelligent controller **102**. A

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microwave oven recipe program from memory **1310** may preferably be selected by scanning a unique product code, such as a UPC symbol on a consumer package (i.e. food container or box) using bar code reader **1326**. In one preferred embodiment, the bar code reader **1326** is shaped like a pen and activates by pressing button **1328**. An audible signal is generated upon the successful scanning of the unique product code, such as a UPC symbol when button **1326** is activated.

The bar code reader controller **1324** receives the read UPC symbol from the bar code reader **1326** and converts the bar code symbol into digital data that is read by the controller **1302** over bus **1304**. The controller **1302** then identifies if one of the bread making recipe program in memory **1310** is associated with the digital data received from the bar code reader controller **1324**. In other embodiments, the other types of input reader controllers may be used that control such things as manual inputs, punch card readers, and magnetic media readers, to name but a few.

Upon identifying the microwave oven recipe program, the controller **1302** then execute the microwave oven recipe program. Directions for preparing the consumer item are displayed on display **1314** via display controller **1316**, and the power level and cooking time are programmed. The user may also be prompted for serving sizes and to proceed to other steps. The user may respond by using the plurality of buttons **1312** to the different prompts on display **1314**. The controller **1302** also instructs the microwave generator controller **1318** as to when to turn on, off (cook time), and power level that will be used to cook the consumer product that scanned.

During execution of a microwave oven recipe program, the microwave oven **120** may count down the remaining minutes until the consumer product is done. In this preferred approach the controller **1302** sets a counter in the real-time clock **1308** and relays time data to the display controller **1316** that is then shown on display **1314**. The real-time clock **1308** receives time messages from the information controller **102**, periodically. The real-time clock **1308** then synchronizes to the time maintained by the intelligent controller **102**. The real-time clock **1308** functions in similar fashion to the real-time clock **1112** in coffeemaker **116**.

If a UPC that was scanned is not found in memory **1310** by controller **1402**, then the display controller **1316** is instructed by the controller **1302** to display "Not in Memory" on display **1314**. The default microwave oven recipe program is then used with the consumer product. An unknown UPC message is formatted by the controller **1302** containing the unknown UPC a sent via the power line communication unit **1306** to the intelligent controller **102**. Upon the next synchronization between the database **202** and the intelligent controller **102**, the unknown UPC is sent to the web source **104**. If the database **202** contains a microwave oven recipe program associated with the unknown UPC, then the user profile **204** is updated with the microwave oven recipe program and scheduled for download to the intelligent controller **102** upon next synchronization.

In an alternate embodiment, the receipt of an unknown UPC message by the intelligent controller **102** results in an immediate synchronization with the web database **202**. If the UPC is not be found in the database, then the user profile **204** is updated with the UPC as a continuing request for a predetermined period (i.e. one month with a maximum limit of 20 UPCs). If the microwave oven recipe program becomes available during the continuing request predeter-

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mined period, then the microwave oven recipe program is downloaded to microwave oven **120** via the intelligent controller **102**.

Oven

In FIG. **14**, a block diagram of the oven **122** with a local network communication unit **1406** of FIG. **1** is shown. Local network communication unit **1406** is preferably a power line communication unit. In the oven **122**, a controller **1402** is operably connected via a bus **1404** to the power line communication unit **1406**, a real-time clock **1408**, a memory **1410**, a plurality of controls **1412**, a display **1414** via a display controller **1416**, a burner controller **1418**, and a optional product code input controller, such as a bar code reader controller **1422**. Examples of other types of product code input controllers include manual input controllers for accepting entered data, magnetic media reader controllers, punch card reader controllers, to name but a few. The burner controller **1418** the temperature of the oven by controlling the heat generated by a heating element. The term oven is used to describe any type of appliance that cooks in an enclosed cavity with heat generated by non-microwave means and include for example gas ovens, electric ovens, convection ovens, or combinations such as an ultravvection oven. The heating element may be an electrical heating element or a fossil fuel type burner. The bar code reader **1422** is connected to a bar code reader **1424** having a button **1426** that activates the bar code reader **1422**.

The controller **1402** is preferably a microprocessor. In an alternate embodiment, controller **1202** may be a reduced instruction set chip (RISC) processor, micro-controller, digital circuits functioning as a controller, analog circuits functioning as a controller, a combination of analog and digital circuits functioning as a controller, or a digital signal processor.

The display **1414** is preferably able to display text and low-resolution graphics. The display is controlled by a display controller **1416** that is in communication with memory **1410** and controller **1402**. The display **1414** may be a liquid crystal non-color display. In an alternate embodiment, a high-resolution display may be used. Further, a color display may be used in yet another embodiment. Even through a LCD display has been used with the preferred embodiment, any other types of displays that are capable of displaying data may be used, including cathode ray tubes and plasma displays. The display may even be a touch screen that combines the plurality of controls **1412** with display **1414**.

The power line communication unit **1406** is a unit that transmits a carrier signal that is capable of transporting data between devices over the traditional home AC wiring that electrical appliances receive power from. Thus, the power line communication unit **1406** is shown as both a power supply for the oven **122** and a communication unit that enables two-way communication with the intelligent controller **102** that share the AC wiring. Examples of such power line communication approaches include; X-10, CEBUS, and POWERBUS by Domosys Corp. Of course, other local network interfaces could alternatively be used.

The power line communication unit **1406** enables two-way communication from an appliance to another device and the exchange of data including recipe programs and time synchronization messages. The two-way communication preferably does not occur over a continuous communication path, rather communication occurs between the appliance and the intelligent controller **102** and then between the intelligent controller **102** and the server **104**. Similarly,

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communication may occur between the server **104** and the intelligent controller **102**, and then between the intelligent controller **102** and appliances. In alternate embodiments, a communication may be established between the appliance and the server **104** through the intelligent controller **102**.

The memory **1410** is a combination of random access memory (RAM), such as dynamic random access memory (DRAM), synchronous dynamic random access memory (SDRAM), or other types of read/write memory, and of read only memory (ROM), such as programmable read only memory (PROM), electrically erasable programmable read only memory (EEPROM). In an alternate embodiment, the memory may include external semi-permanent memory, such as magnetic disk (hard disk, removable hard disk, floppy disk), optical disk (CD-RW) or external permanent memory (CD-R and DVD-R). The memory is **1410** is divided into a program portion that controls the operation of the oven **122** and a data portion that maintains configuration data and variables used and manipulated by the controller **1402** upon execution of a program.

In manual operation, the user selects an energy setting (temperature) of the oven **122** using the plurality of controls **1412**. The user may also be able to set a time period for pre-heating the oven and a cooking time period using the plurality of controls **1412**. The oven may be turned on by one of the plurality of controls **1412** that selects the energy setting. Once turned on, controller **1402** in oven **122** executes a default oven recipe program in memory **1410** that instructs the burner controller **1418** to start the heating process by activating the heating element **1420**. When the oven finishes execution of the default oven recipe program the controller **1402** instructs the burner controller **1418** to deactivate the heating element **1420** or to keep the oven warm by reducing the heat generated by the heating element **1420**. The user may also manually set the real-time clock **1404** so time is properly displayed on display **1414** using the plurality of controls **1412**.

The oven may alternatively be configured from the intelligent controller **102** and web device **104**. The intelligent controller **102** detects the presence of oven **122** when the oven **122** broadcasts a message via the power line communication unit **1406** upon being plugged-in to the outlet **130**. The oven **122** also receives timing messages that enable the controller **1420** to set the real-time clock **1408** and display the correct time on display **1414**. In an alternate embodiment the intelligent controller **102** periodically checks for new appliances either by broadcasting a message to all appliances connected to the power line network or by periodically searching for specific types of appliances, such as oven **122**. In yet another embodiment, registration occurs at a web page displayed on the web device **104** that enables the user to enter information into a user profile **204**, such as selecting an input box associated with the oven **122** or a serial number, that is downloaded to the intelligent controller **102**. The oven may also provide some indication of network connection.

The registered oven **122** receives oven recipe programs from the intelligent controller **102** via the local network communication link. The intelligent controller in turn has obtained the information from the data previously selected via web page **236**. If no oven recipes are selected, the oven **122** is loaded from defaults oven recipes from the user profile **204** via the intelligent controller **102**. The oven recipe program from memory **1410** may preferably be selected by scanning a unique product code, such as a UPC symbol on a consumer package (i.e. food container or box) using bar code reader **1424**. In one preferred embodiment, the bar

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code reader **1424** is shaped like a pen and activates by pressing button **1426**. An audible signal is generated upon the successful scanning of a UPC symbol when button **1426** is activated.

The bar code reader controller **1422** receives the read UPC symbol from the bar code reader **1424** and converts the bar code symbol into digital data that is read by the controller **1402** over bus **1404**. The controller **1402** then identifies if a oven recipe program that is associated with the digital data received from the bar code reader controller **1422**. In alternate embodiments, other types of product code reader controllers may be used, such as manual input controllers, punch card controllers, magnetic media reader controllers, to name but a few.

Upon identifying the microwave oven recipe program, the controller **1402** then starts to execute the oven recipe program. Directions for use of the oven recipe program are displayed on display **1414** via display controller **1416**. The user may also be prompted for serving sizes and to proceed in the preparation of the scanned consumer product. The user may respond to such by using the plurality of controls **1412**. The controller **1402** also instructs the burner controller **1418** as to when to turn on and off, and what temperature is required to cook the consumer product that was previously scanned.

During execution of a program associated with the selected oven recipe program, the oven **122** may count down and display the remaining minutes until the consumer product is done. The controller **1402** sets a counter in the real-time clock **1408** and relays time data to the display controller **1416** that is then shown on display **1414**. The real-time clock **1408** receives time messages from the information controller **102**, periodically. The real-time clock **1408** then synchronizes to the time maintained by the intelligent controller **102**. The real-time clock **1408** functions in similar fashion to the real-time clock **1112** in coffeemaker **116**.

If a UPC that was scanned is not found in memory **1410** by controller **1402**, then the display controller **1416** is instructed by the controller **1402** to display "Not in Memory" on display **1414**. The default oven recipe program is then used with the consumer product or the user is prompted to manual set the oven **122**. An unknown unique product code message is formatted by the controller **1402** containing the unknown unique product code, such as a UPC and sent via the power line communication unit **1406** to the intelligent controller **102**. Upon the next synchronization between the database **202** and the intelligent controller **102**, the unknown UPC is sent to the web source **104**. If the database **202** contains a recipe associated with the unknown UPC, then the user profile **204** is updated with the oven recipe program and scheduled for download to the intelligent controller **102** upon next synchronization. In an alternate embodiment, the receipt of an unknown UPC message by the intelligent controller **102** results in an immediate synchronization with the web database **202**. If the UPC is not be found in the database, then the user profile **204** is updated with the UPC as a continuing request for a predetermined period (i.e. one month with a maximum limit of 20 UPCs). If the oven recipe program becomes available during the continuing request predetermined period, then the oven recipe program is downloaded to the oven **122** via the intelligent controller **102**.

Flow Chart

Turning to FIG. **15**, a flow chart of an intelligent coffee-maker process is shown. The coffeemaker **116** is a household

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appliance that is energized (1502) by connecting the coffeemaker 116 to the AC wiring of a home at a wall receptacle 124. The coffeemaker 116 is configured with a communication interface, such as the power line communication unit 1106, that enables bi-direction communication across a home network with other network devices. Upon the coffeemaker 116 being energized (1502), an announcement message is formatted by the controller 1102 and transmitted by the power line communication unit for reception by a device such as intelligent controller 102. The announcement message notifies at least one other device in the home network that the coffeemaker 116 is present and energized.

The coffeemaker 116 may also receive a time synchronization message that enables the real-time clock 1112 in the coffeemaker 116 to be set to a network time (1506). In an alternate embodiment the coffeemaker 116 may set a human perceptible synchronization indicator for a preset time period, such as a light emitting diode (LED), symbol on a display, audio signal, mechanical signal (i.e. a raised flag). If another synchronization message is not received during the preset time period, then the human perceptible synchronization indicator is unset. The synchronization message is periodically received at the power line communication unit either in response to a request triggered by an event or upon time synchronization message being broadcast to all network devices 116–122 from a master time keeping device.

A plurality of timers controlled by the real-time clock 1112 in coffeemaker 116 are configured remotely, stored in a database 202 and downloaded to the coffeemaker 116 from the intelligent controller 102 upon the coffeemaker being energized. The coffeemaker 116 receives the plurality of timer settings (1508) at power line communication unit 1106 after the coffeemaker 116 has sent its notification message and the controller 1102 configures the real-time clock 1112 with the plurality of timer settings. In an alternate embodiment, the plurality of timer settings may periodically be transmitted in the network with no prior knowledge that a coffeemaker 116 is present. When the controller 1102 in coffeemaker 116 detects a message containing the plurality of timer settings, it processes the message and configures the real-time clock 1112 accordingly.

Upon the plurality of timer settings being received and the real-time clock 1112 configured with the plurality of timer settings (1508), the controller 1102 formats a status message for reception by another network device that reports the coffeemaker 116 is in a “not ready” state (1510). A not ready state is identified as the coffeemaker 116 having a timer set to start the brewing of coffee, but the coffeemaker 116 has not been set up and/or activated. A coffeemaker 116 needs to have water, coffee and a filter in order to brew coffee or at a minimum water if hot water is expected. Because a user must interact with the coffeemaker to prepare it for brewing, a button among the plurality of buttons 1120 is preferably pressed to signal the coffeemaker 116 is ready to brew. Alternatively, one or more sensors may be used to determine if the coffeemaker is ready. Upon pressing the button among the plurality of buttons 1120, the coffeemaker 116 is in an active or sometimes called the ready to brew state.

If the coffeemaker 116 is in the active (ready to brew) state (1512), then the controller 1102 formats a state change message for reception by another network device such as an intelligent controller 102 informing the other network device that the coffeemaker is in the active state and ready to brew. The power line communication unit 1106 send the state change message via the home network to the other network device (1514).

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The real-time clock 1112 keeps track of time and the plurality of timer settings. If none of the timer settings is equal to the real-time clock 1112 time (1516), then another check of the plurality of timer settings and the real-time clock time (1516) is conducted. When each of the timer settings is equal to the real-time clock 1112 time (1516), then the state of the coffeemaker 116 is changed to a brewing state, a brewing timer may be set and a state message informing another network device of the brewing state of the coffeemaker 116 is formatted (1518). The state message sent by the power line communication unit 1106 across the home network. The coffee is brewed (1520) while the brewing timer is active. It is possible for other liquids such as tea and hot water to be brewed other than coffee.

The expiration of the brew timer is periodically checked (1522) and if not expired, brewing continues (1520). Upon the brew timer being expired (1522), the state of the coffeemaker is changed to a ready state, a warming timer is set for one hour and a state message formatted for reception by another network device such as an intelligent controller (1524). The warming timer is used to in order to have the heating element controller 1114 turn off the warming plate 1118 after an hour.

The warming timer is periodically checked (1526) to determine if the warming timer has expired. If the warming timer has expired, then the warming plate 1118 is turned off and the state of the coffeemaker 116 is changed to not ready. The state message is formatted and sent across the in home network for reception by another device (1510).

If the coffeemaker 116 is not in the active or “ready to brew” state (1512) then processing is delayed until the user places the coffeemaker 116 into the “ready to brew” state by activating a signaling device such as a button among the plurality of buttons 1120 or changing a position of a switch. A check for the activation of the signaling device occurs (1128) and if no activation has occurred, then another check (1128) occurs. Upon the activation, the coffeemaker 116 changes state to “ready to brew” and formats a state message containing the “ready to brew” state for another network device (1514).

It is appreciated by those skilled in the art that the process shown in FIG. 15 may selectively be implemented in hardware, software, or a combination of hardware and software. An embodiment of the process steps employs at least one machine-readable signal bearing medium. Examples of machine-readable signal bearing mediums include computer-readable mediums such as a magnetic storage medium (i.e. floppy disks, or optical storage such as compact disk (CD) or digital video disk (DVD)), a biological storage medium, or an atomic storage medium, a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, an application specific integrated circuit having appropriate logic gates, a programmable gate array(s) (PGA), a field programmable gate array (FPGA), a random access memory device (RAM), read only memory device (ROM), electronic programmable random access memory (EPROM), or equivalent. Note that the computer-readable medium could even be paper or another suitable medium, upon which the computer instruction is printed, as the program can be electronically captured, via for instance optical scanning of the paper or other medium, then compiled, interpreted or otherwise processed in a suitable manner if necessary, and then stored in a computer memory.

Additionally, machine-readable signal bearing medium includes computer-readable signal bearing mediums. Computer-readable signal bearing mediums have a modulated carrier signal transmitted over one or more wire based,

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wireless or fiber optic networks or within a system. For example, one or more wire based, wireless or fiber optic network, such as the telephone network, a local area network, the Internet, or a wireless network having a component of a computer-readable signal residing or passing through the network. The computer readable signal is a representation of one or more machine instructions written in or implemented with any number of programming languages.

Furthermore, the multiple process steps implemented with a programming language, which comprises an ordered listing of executable instructions for implementing logical functions, can be embodied in any machine-readable signal bearing medium for use by or in connection with an instruction execution system, apparatus, or device, such as a computer-based system, controller-containing system having a processor, microprocessor, digital signal processor, discrete logic circuit functioning as a controller, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions.

While various embodiments of the application have been described, it will be apparent to those of ordinary skill in the art that many more embodiments and implementations are possible that are within the scope of this invention. Accordingly, the invention is not to be restricted except in light of the attached claims and their equivalents.

I claim:

1. An apparatus, comprising:
a coffeemaker;
a clock with a plurality of timers;
a controller with a communication path to the clock; and
a network interface connected to the communication path in receipt of a plurality of timer settings that are set in the clock by the controller that controls the coffeemaker;
wherein the controller is configured to form a message containing a state of the coffeemaker apparatus, and the network interface transmits the state message from the network interface for reception by another device.
2. The apparatus of claim 1, wherein the state of the coffeemaker is a not ready state upon the plurality of timer settings being set.
3. The apparatus of claim 2, further comprising:
a button that when selected results in the state of the coffeemaker being in a ready to brew state.
4. The apparatus of claim 3, wherein a brew timer is set upon a time kept by the clock matching one of the plurality of timer settings and results in the state of the coffeemaker apparatus being in a brewing state.
5. The apparatus of claim 4, further comprising:
a warming plate that is turned off upon the expiration of a warming timer that is set upon the expiration of the brew timer and results in the state of the coffeemaker being a coffee ready state.
6. The apparatus of claim 1, further comprising:
a memory that stores the plurality of timer settings.
7. The apparatus of claim 1, wherein a time synchronization message having a time that is received by the network interface and results in the clock being set to the time in the time synchronization message.
8. The apparatus of claim 1, further comprising:
a display in communication with the clock over the communication path that displays a time on the display.

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9. The apparatus of claim 1, further comprising:
a display in communication with the controller over the communication path that displays the state of the coffeemaker.

10. A method, comprising:
receiving at a coffeemaker apparatus with a network interface at least one timer setting at the network interface;
setting a clock with the at least one timer setting;
setting a state of the coffeemaker apparatus;
formatting a state message containing the state;
transmitting the state message from the network interface for reception by another device; and
controlling the coffeemaker apparatus based on the state of the coffeemaker apparatus.

11. The method of claim 10, wherein setting the state further includes:
setting the state of the coffeemaker apparatus to a not ready state upon the setting of the clock with the at least one timer settings.

12. The method of claim 10, wherein setting the state further includes:
signaling from an input device on the coffeemaker apparatus; and
setting the state of the coffeemaker apparatus to a ready to brew state in response to the signaling of the input device.

13. The method of claim 10, wherein setting the state further includes:
identifying that the clock has reached the at least one timer settings;
initializing a brew timer to a predetermined time value; and
setting the state of the coffeemaker apparatus to a brewing state.

14. The method of claim 13, wherein setting the state further includes:
identifying that brew timer has expired;
setting a warming timer in response to the brew timer expiring; and
changing the state of coffeemaker apparatus to a coffee ready state.

15. The method of claim 14, wherein setting the state further includes:
identifying that the warming timer has expired; and
changing the state of the coffeemaker apparatus to a not ready state in response to the expiration of the warming timer.

16. The method of claim 14, further including:
deactivating a warming plate in response to expiration of the warming timer.

17. The method of claim 10, further comprising:
displaying on a display a time from the clock.

18. The method of claim 10, further comprising:
displaying on a display a state of the coffeemaker appliance.

19. The method of claim 10, further comprising:
receiving a time synchronization message at the network interface of the coffeemaker appliance; and
setting the clock in response to the time synchronization message.

20. An apparatus, comprising:
means for receiving at a coffeemaker apparatus at least one timer setting at the network interface;
means for setting a clock with the at least one timer setting;
means for setting a state of the coffeemaker apparatus;

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means for formatting a state message containing the state for reception by another device;
 means for transmitting the state message and;
 means for controlling the coffeemaker apparatus based on the state of the coffeemaker apparatus.

21. The apparatus of claim 20, wherein the means for setting the state further includes:
 means for setting the state of the coffeemaker apparatus to a not ready state upon the setting of the clock with the at least one timer settings.

22. The apparatus of claim 20, wherein the means for setting the state further includes:
 means for signaling from an input device on the coffee-maker apparatus; and
 means for setting the state of the coffeemaker apparatus to a ready to brew state in response to the input device.

23. The apparatus of claim 20, wherein the means for setting the state further includes:
 means for identifying that the clock has reached the at least one timer settings;
 means for initializing a brew timer to a predetermined time value; and
 means for setting the state of the coffeemaker apparatus to a brewing state.

24. The apparatus of claim 23, wherein the means for setting the state further includes the steps of:
 means for identifying that brew timer has expired;

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means for setting a warming timer in response to the brew timer expiring; and
 means for changing the state of coffeemaker apparatus to a coffee ready state.

25. The apparatus of claim 24, wherein the means for setting the state further includes the steps of:
 means for identifying that the warming timer has expired; and
 means for changing the state of the coffeemaker apparatus to a not ready state in response to the expiration of the warming timer.

26. The apparatus of claim 24, further including:
 means for deactivating a warming plate in response to expiration of the warming timer.

27. The apparatus of claim 20, further comprising:
 means for displaying on a display a time from the clock.

28. The apparatus of claim 20, further comprising:
 means for displaying on a display a state of the coffee-maker appliance.

29. The apparatus of claim 20, further comprising:
 means for receiving a time synchronization message at the network interface of the coffeemaker appliance; and
 means for setting the clock in response to the time synchronization message.

* * * * *



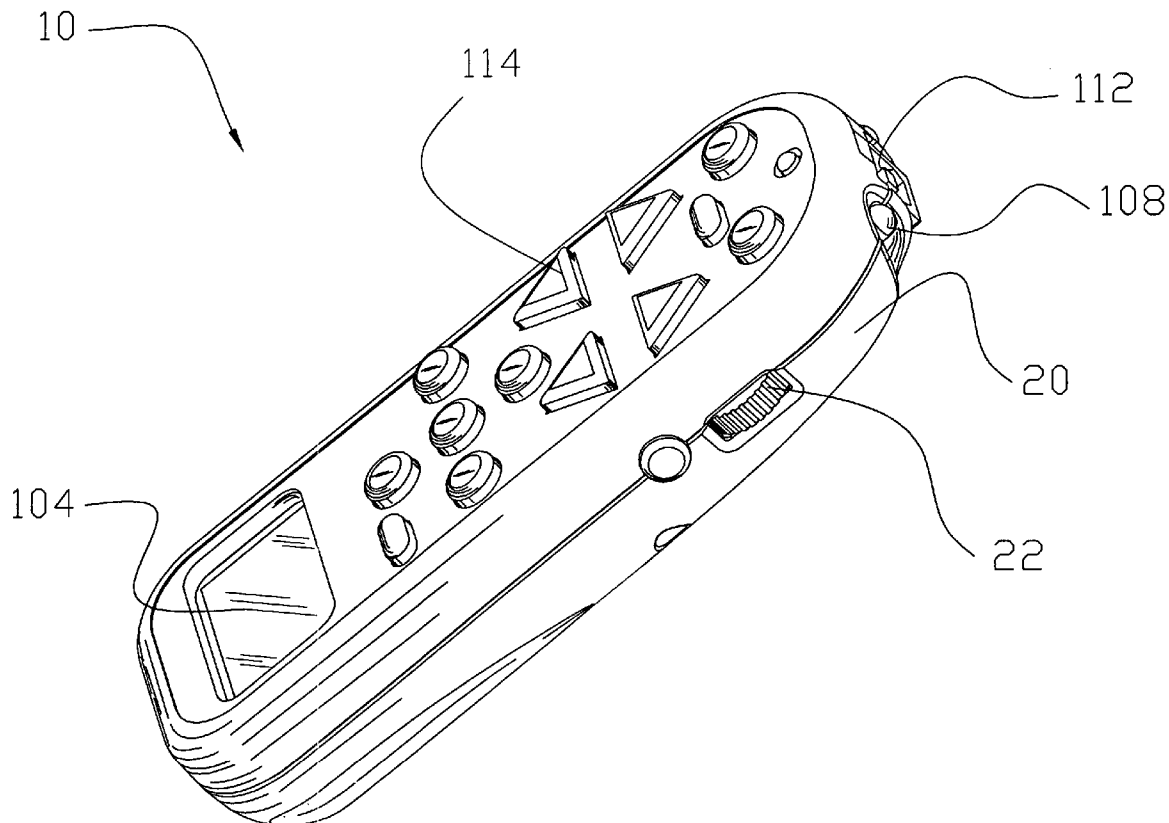
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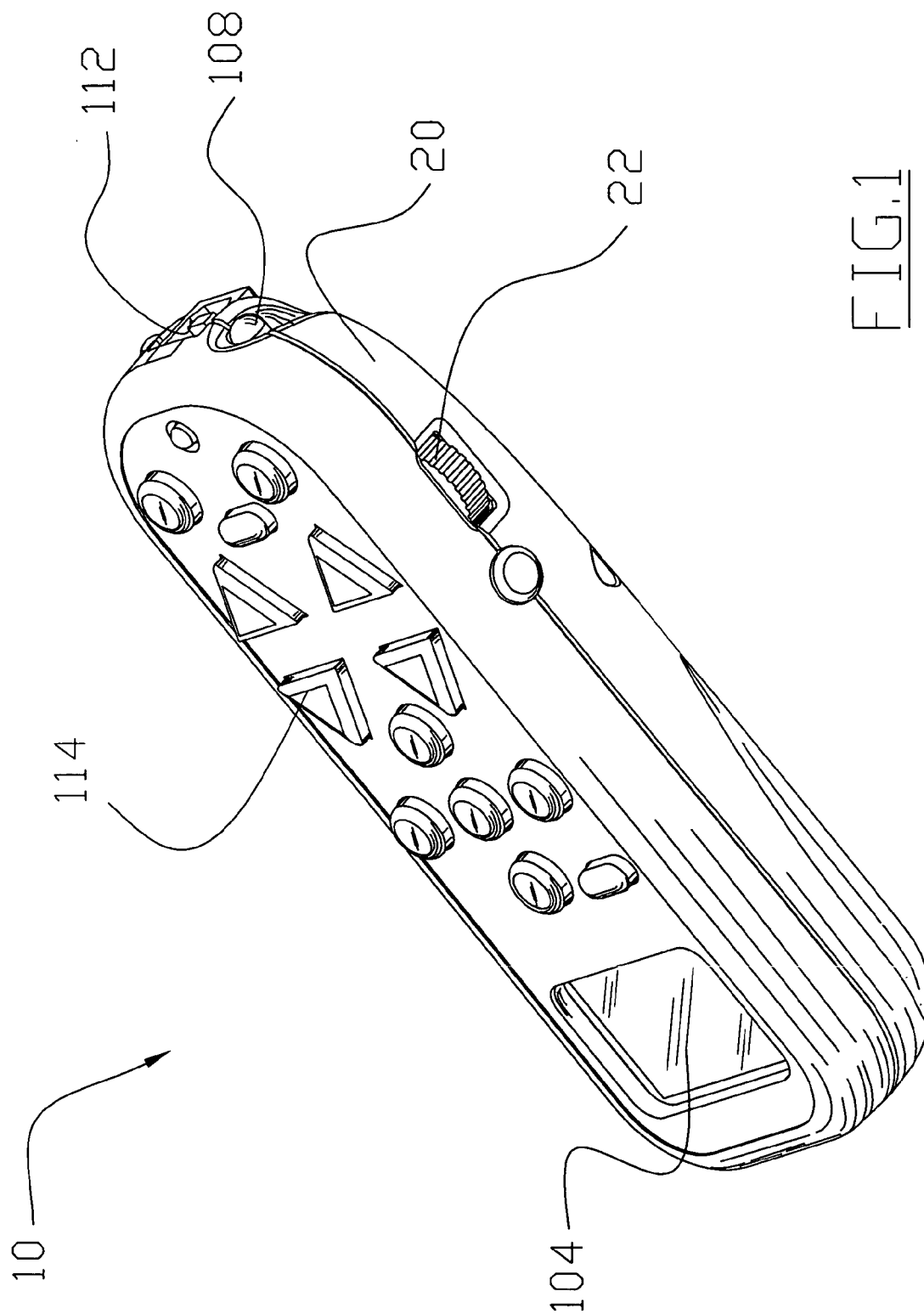
(19) **United States**(12) **Patent Application Publication**
Harris et al.(10) **Pub. No.: US 2005/0052423 A1**(43) **Pub. Date: Mar. 10, 2005**(54) **ONLINE REMOTE CONTROL
CONFIGURATION SYSTEM****Publication Classification**(76) Inventors: **Glen McLean Harris**, Mississauga
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(CA)(51) **Int. Cl.⁷** **H04K 1/00**; H04L 9/00;
G06F 17/60; G09G 5/00(52) **U.S. Cl.** **345/169**

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LLP****TWO EMBARCADERO CENTER****EIGHTH FLOOR****SAN FRANCISCO, CA 94111-3834 (US)**(57) **ABSTRACT**

An online remote control configuration system for efficiently programming a remote control to recognize a plurality of external electronic devices. The online remote control configuration system includes a remote control having a housing, a keypad, and an electronic system for receiving configuration data from a control station via a global computer network (e.g. Internet). The user preferably "samples" one or more signals from a remote control into the electronic system and then uploads the samples to the control station. The control station analyzes the uploaded samples and transmits the appropriate configuration data to properly configure the electronic system. The user may also access a web site of the control station and manually select each of the external electronic devices that the remote control is to operate after which the control station sends the appropriate configuration data to the electronic system.

(21) Appl. No.: **10/839,970**(22) Filed: **May 5, 2004****Related U.S. Application Data**(63) Continuation of application No. 09/804,623, filed on
Mar. 12, 2001, now abandoned.(60) Provisional application No. 60/189,487, filed on Mar.
15, 2000.



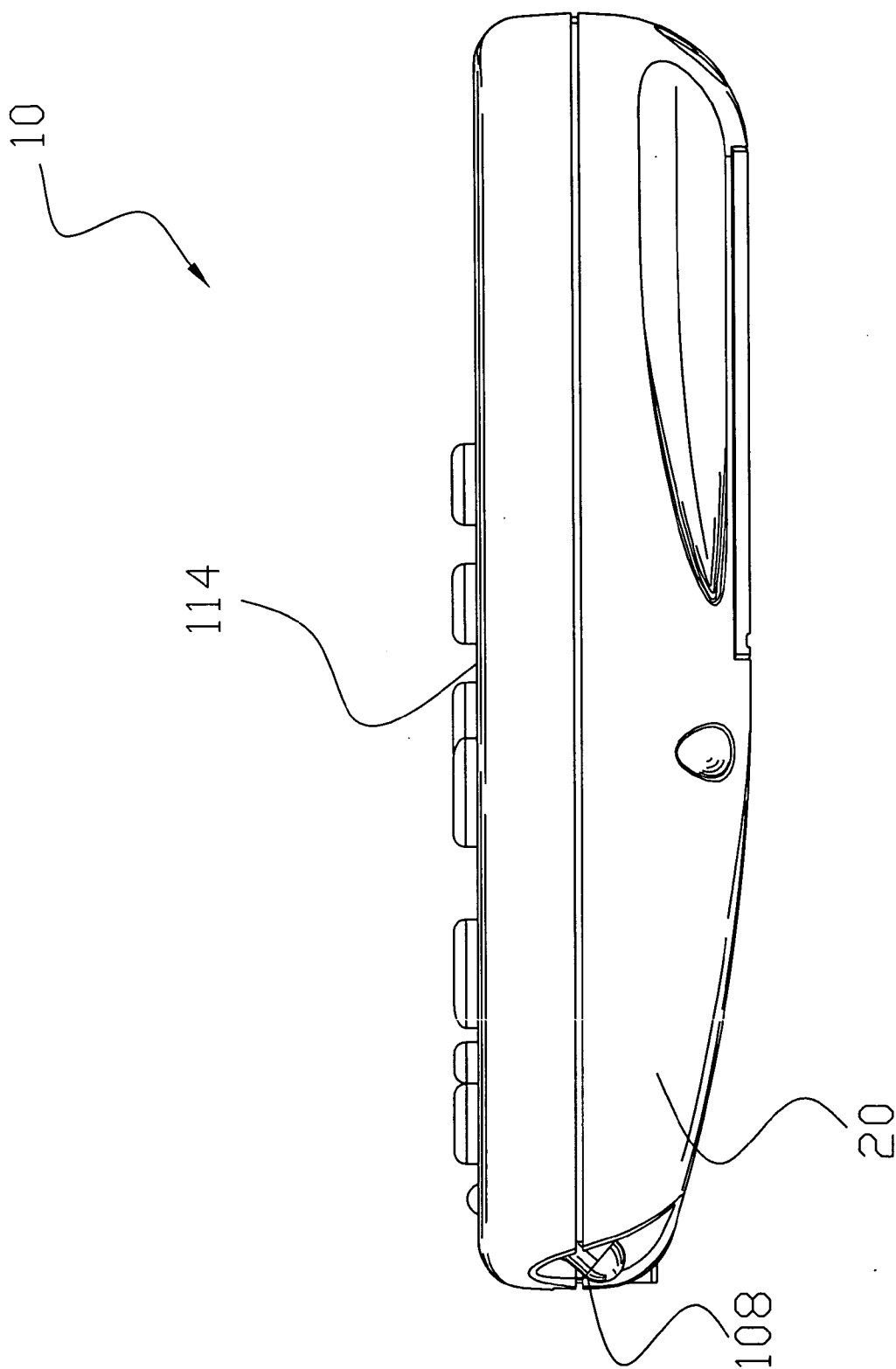
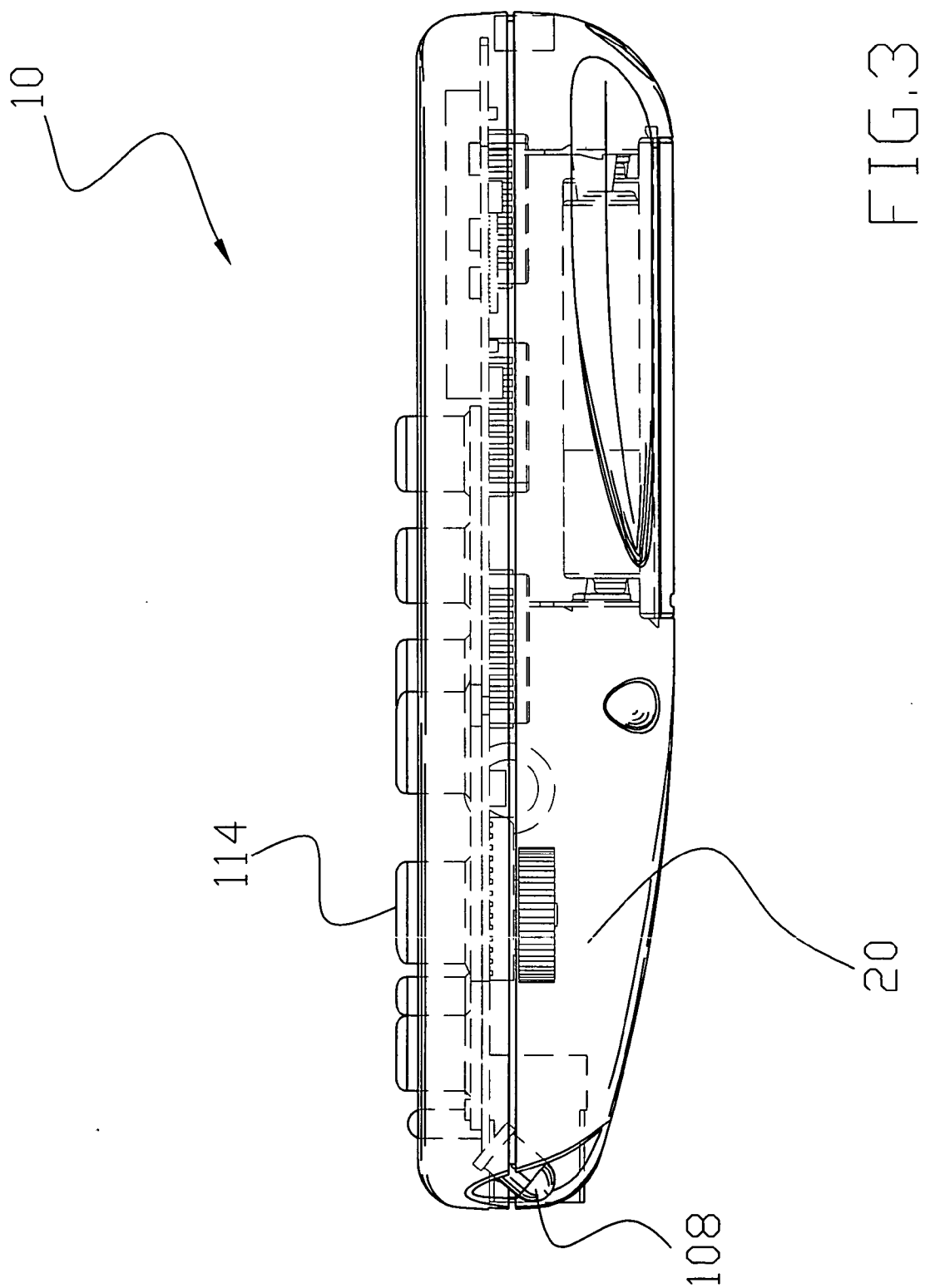


FIG. 2



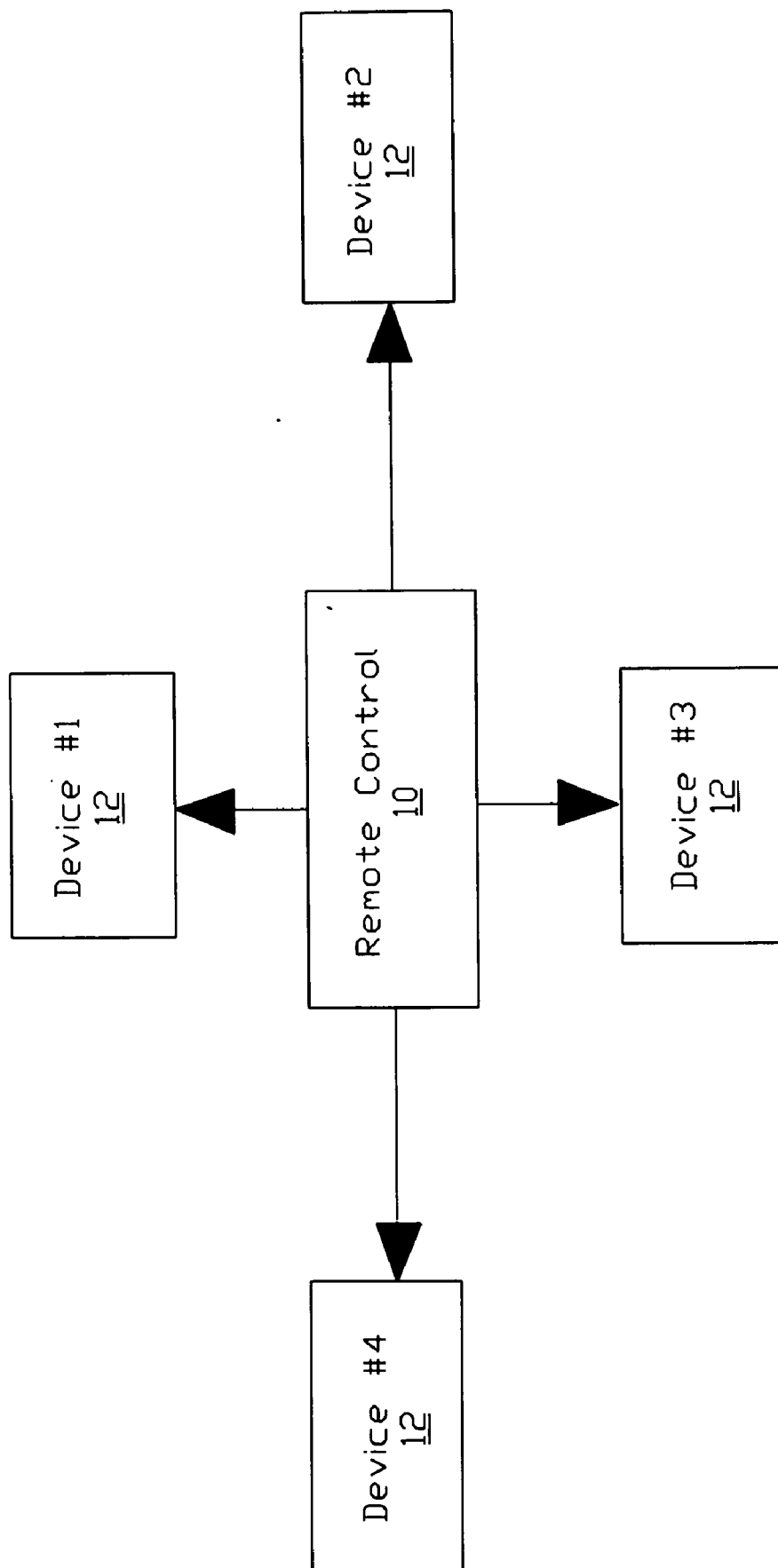


FIG. 4

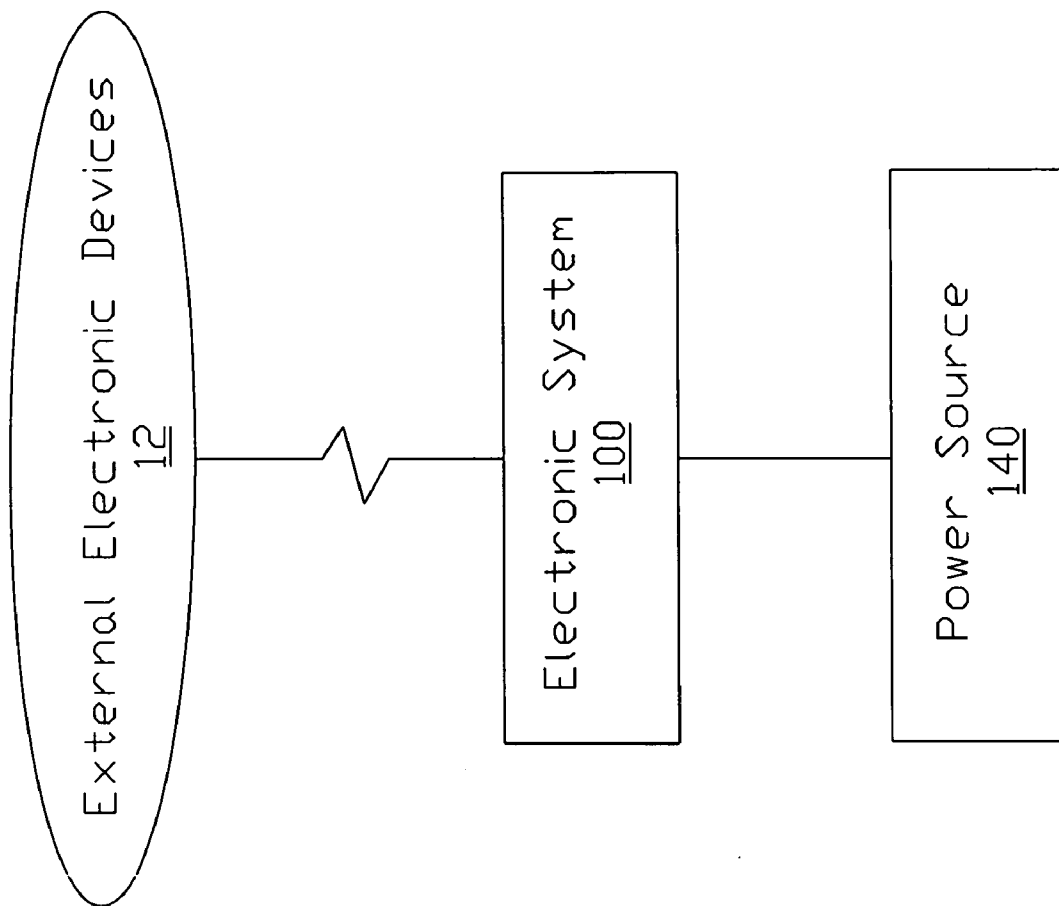


FIG. 5

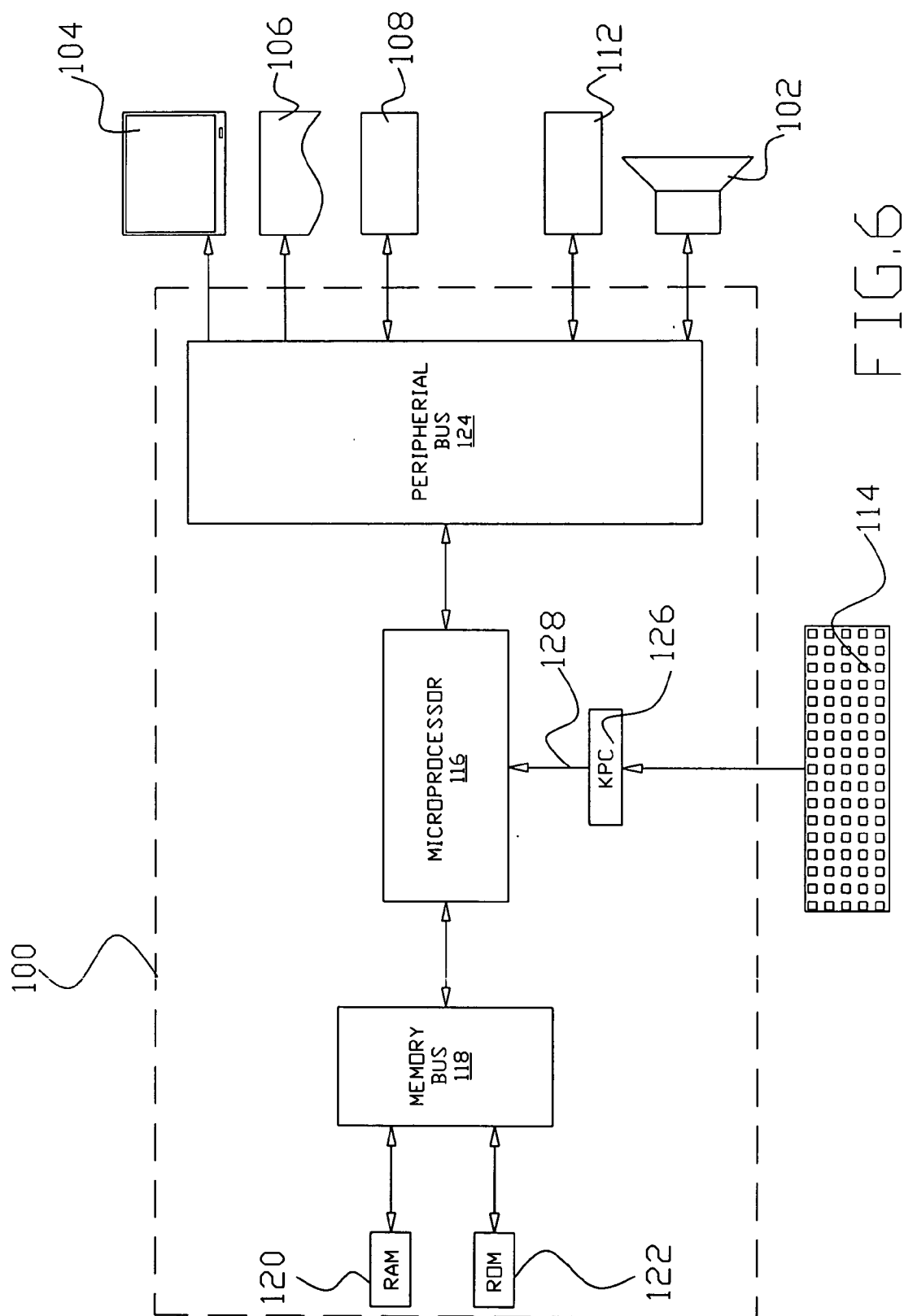


FIG. 6

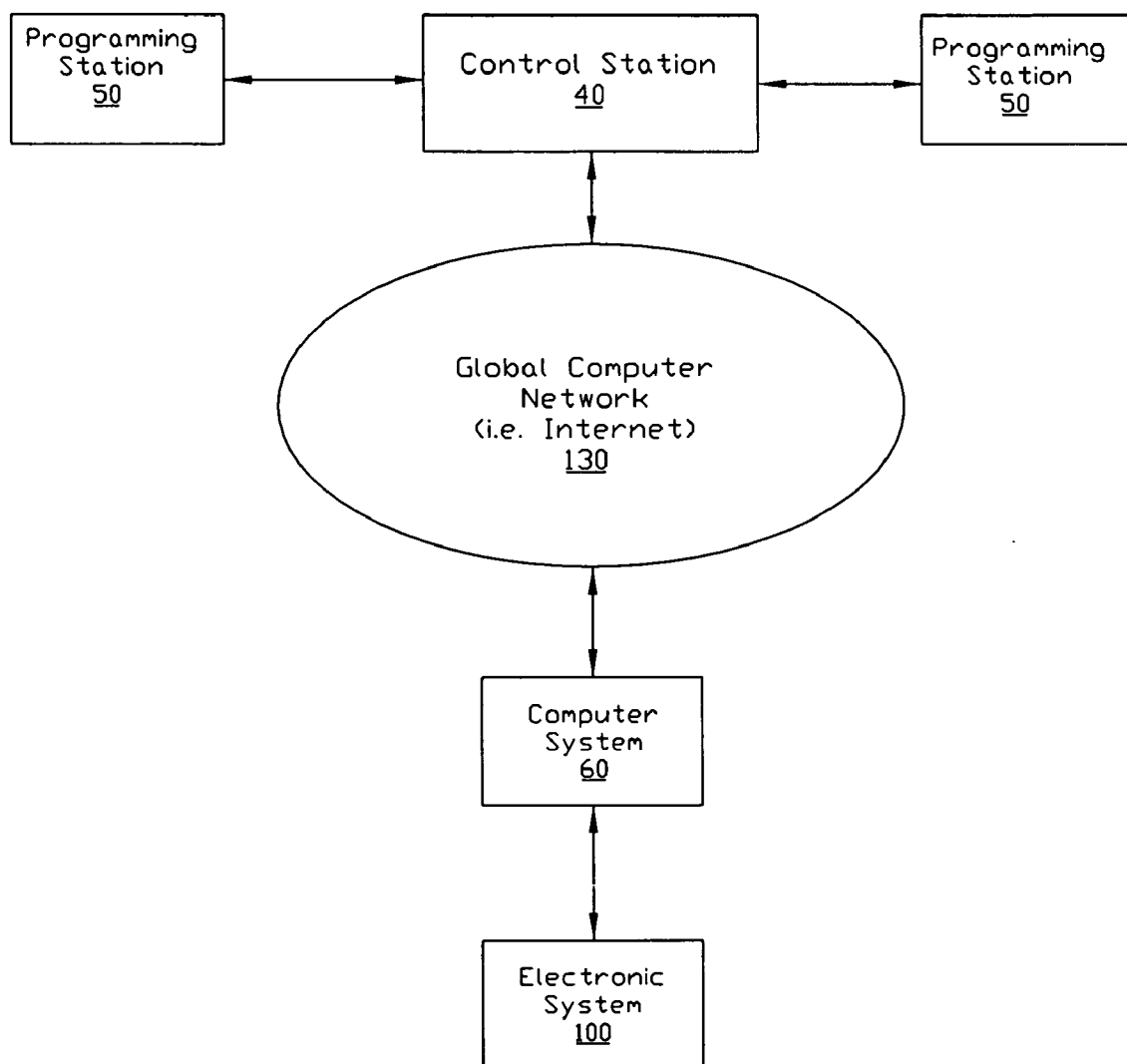


FIG. 7

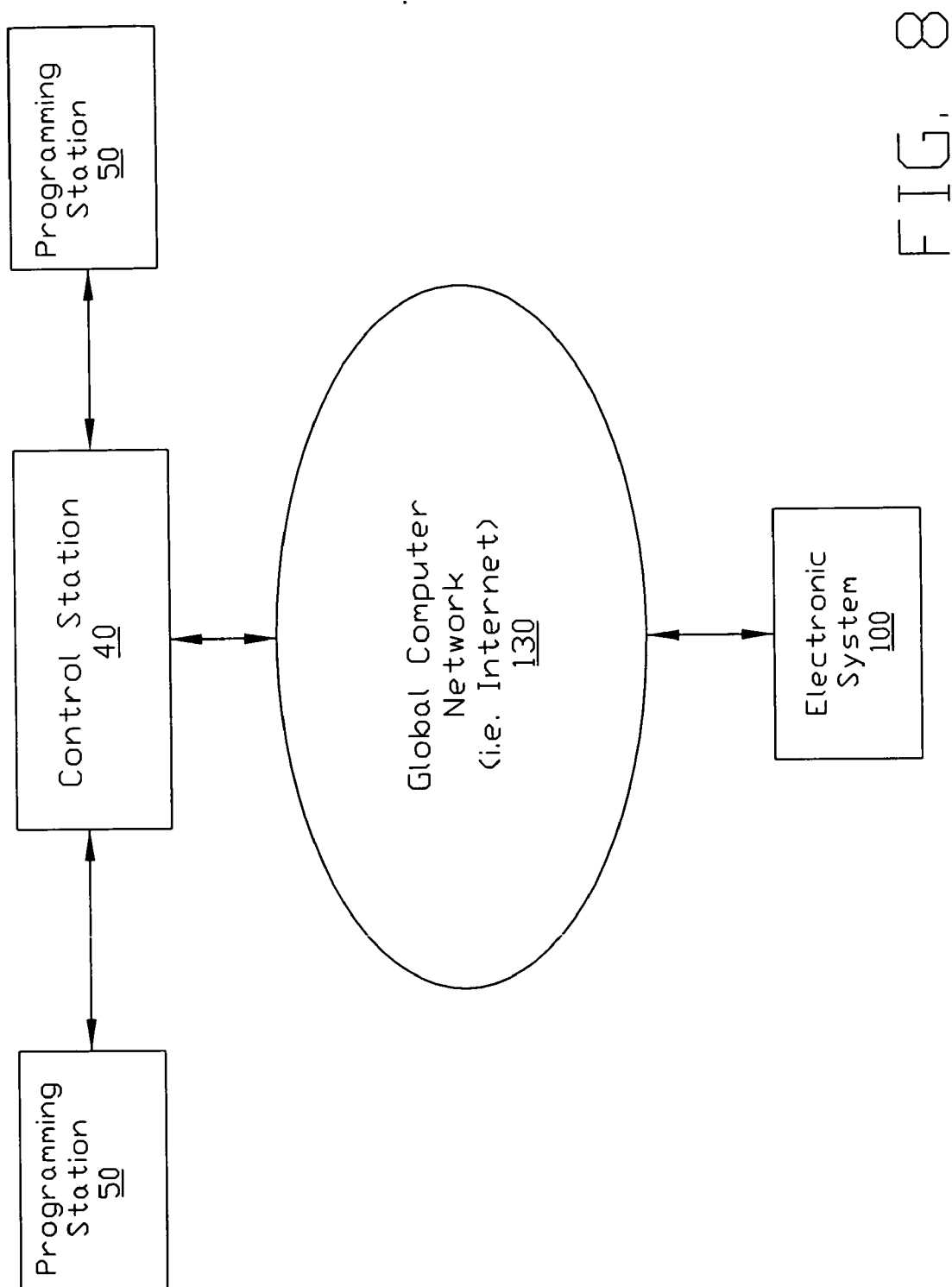


FIG. 8

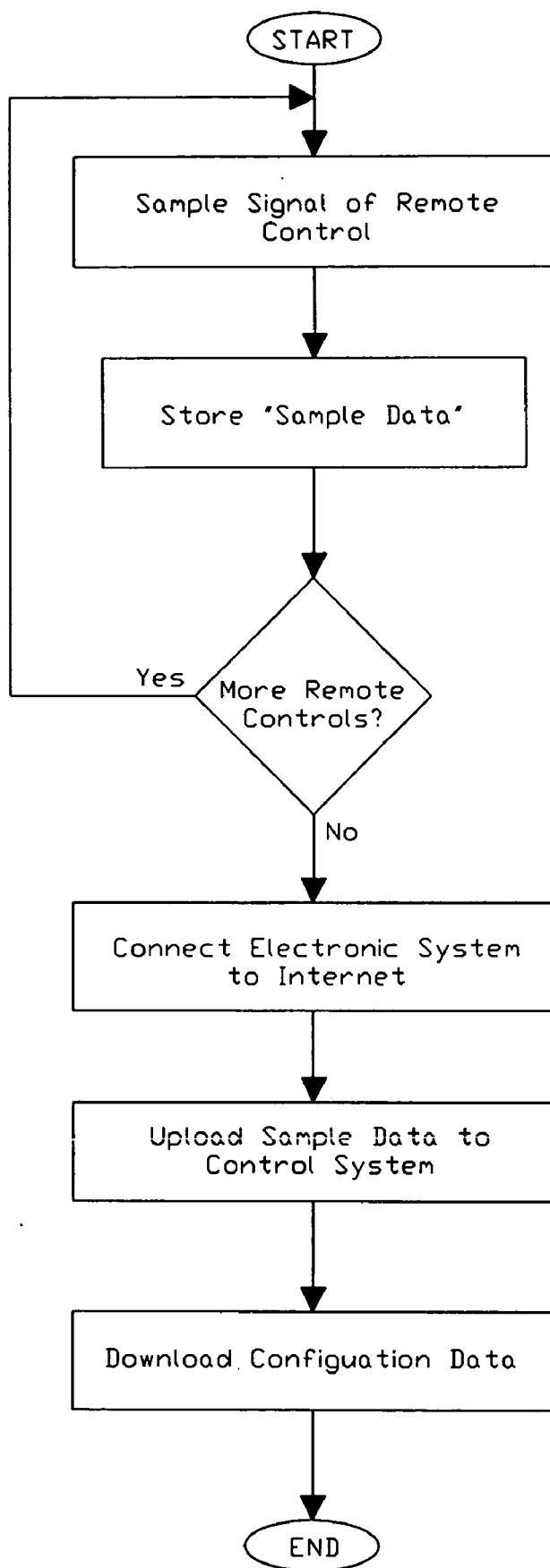
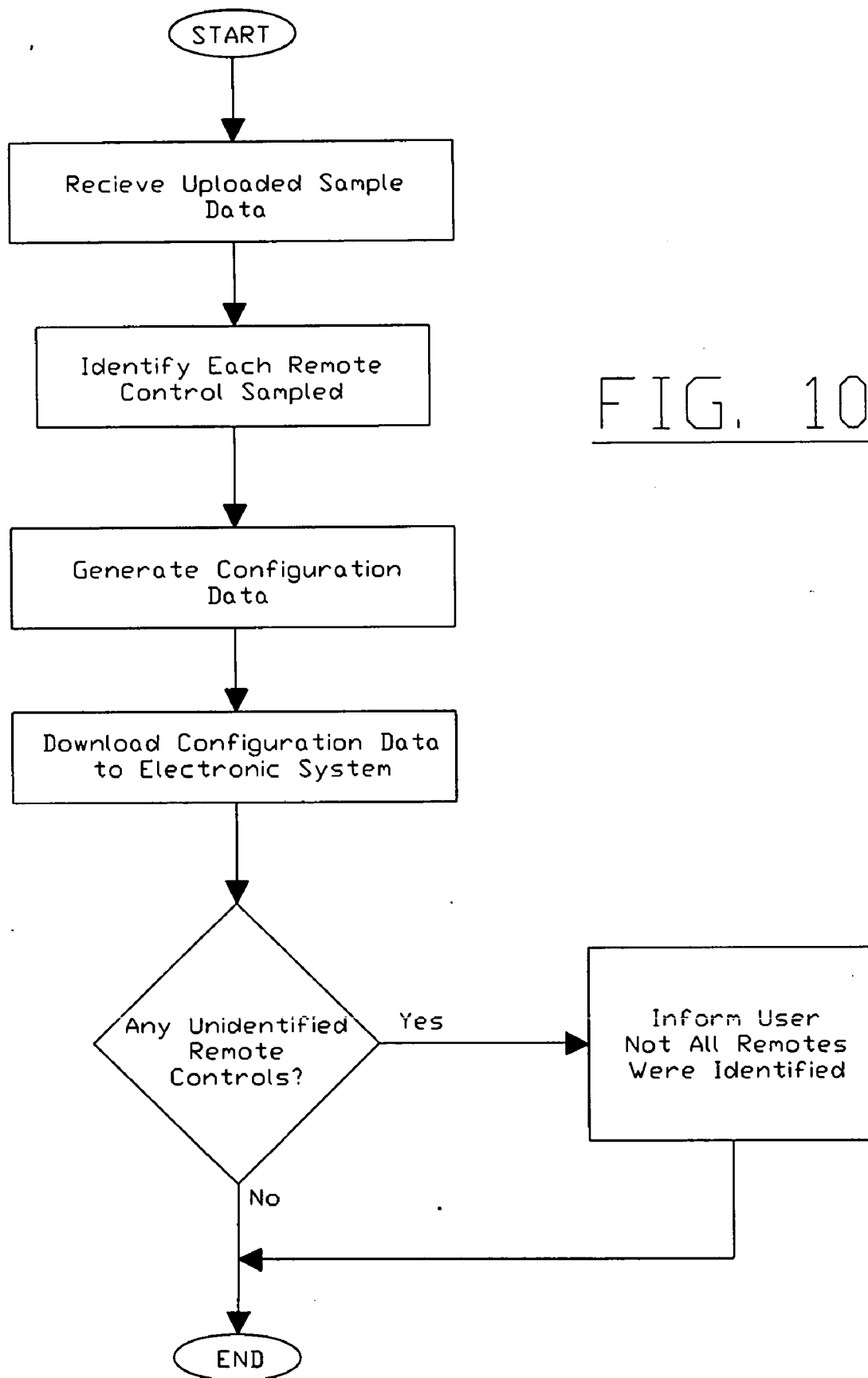


FIG. 9



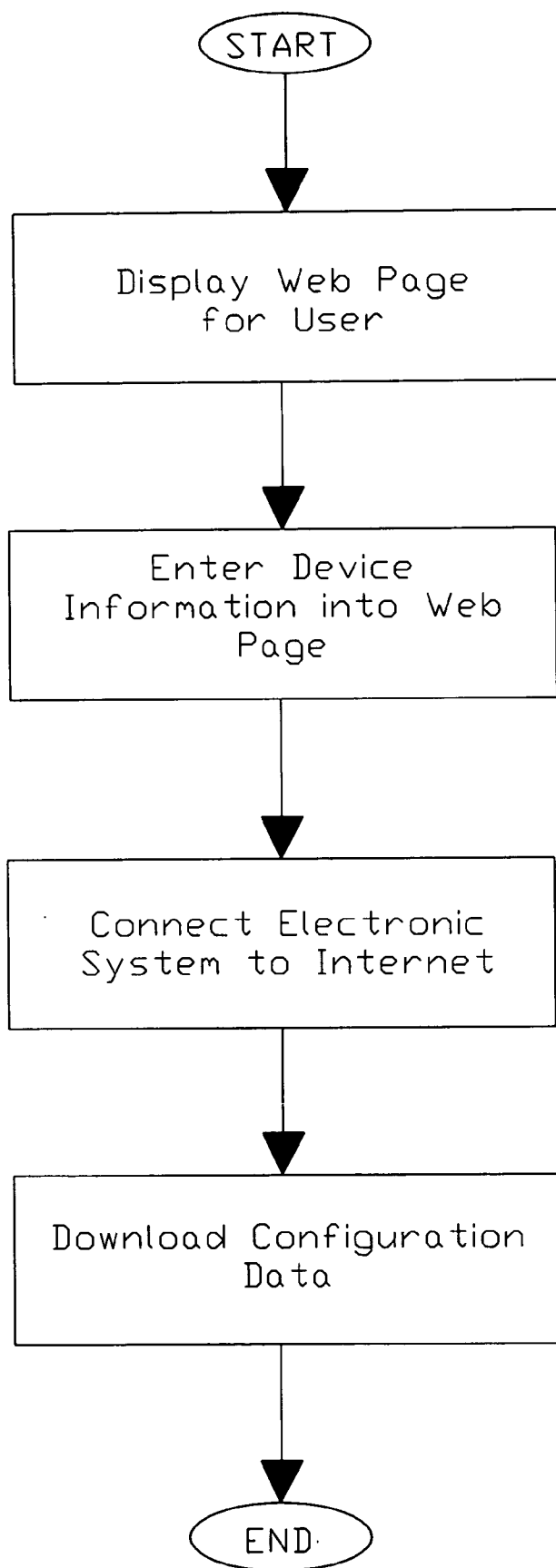


FIG. 11

The image shows a software window titled "Remote Configuration". It has a standard menu bar with "File", "Edit", "View", "Favorites", "Tools", and "Help". Below the menu bar is a toolbar with four icons: a left-pointing arrow, a right-pointing arrow, a hexagon, and an upward-pointing arrow. The main area of the window contains two sections, "Device #1" and "Device #2", each with three dropdown menus for "Type", "Brand", and "Model".

Device	Type	Brand	Model
Device #1	Television	Toshiba	CZ32A50
Device #2	DVD Player	Sony	DVP560D

FIG. 12

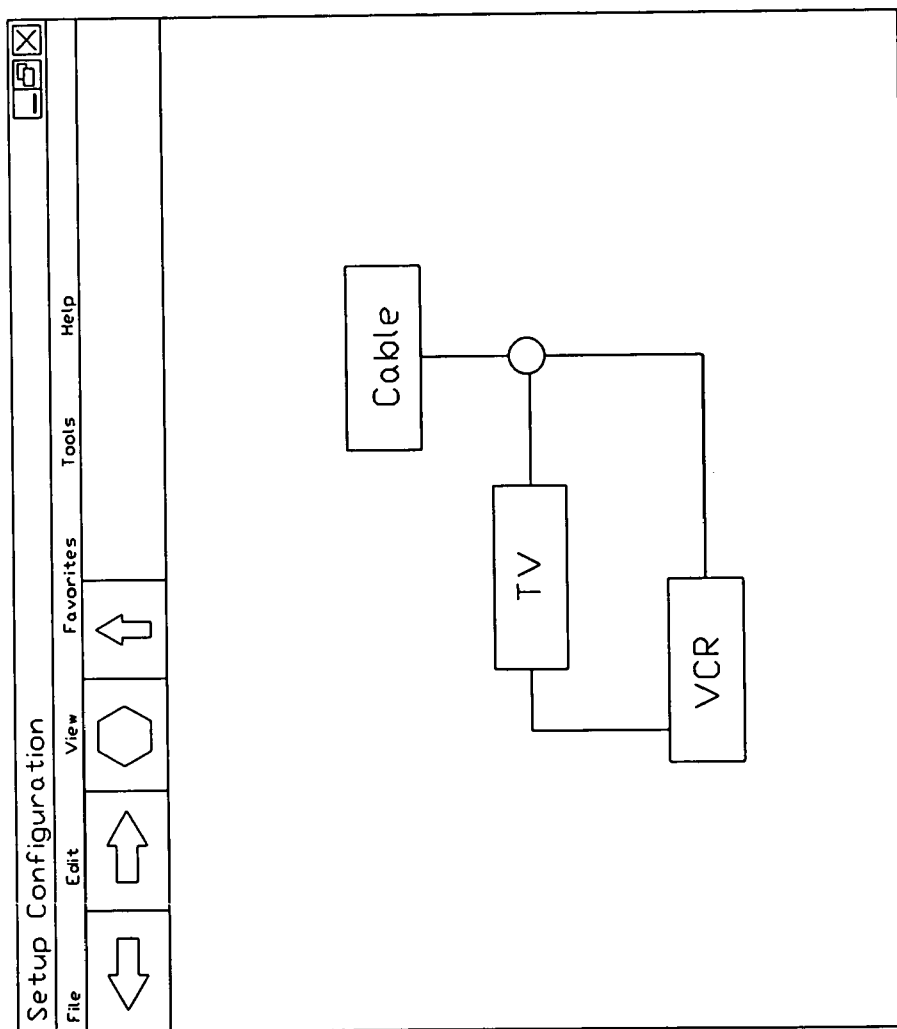


FIG. 13

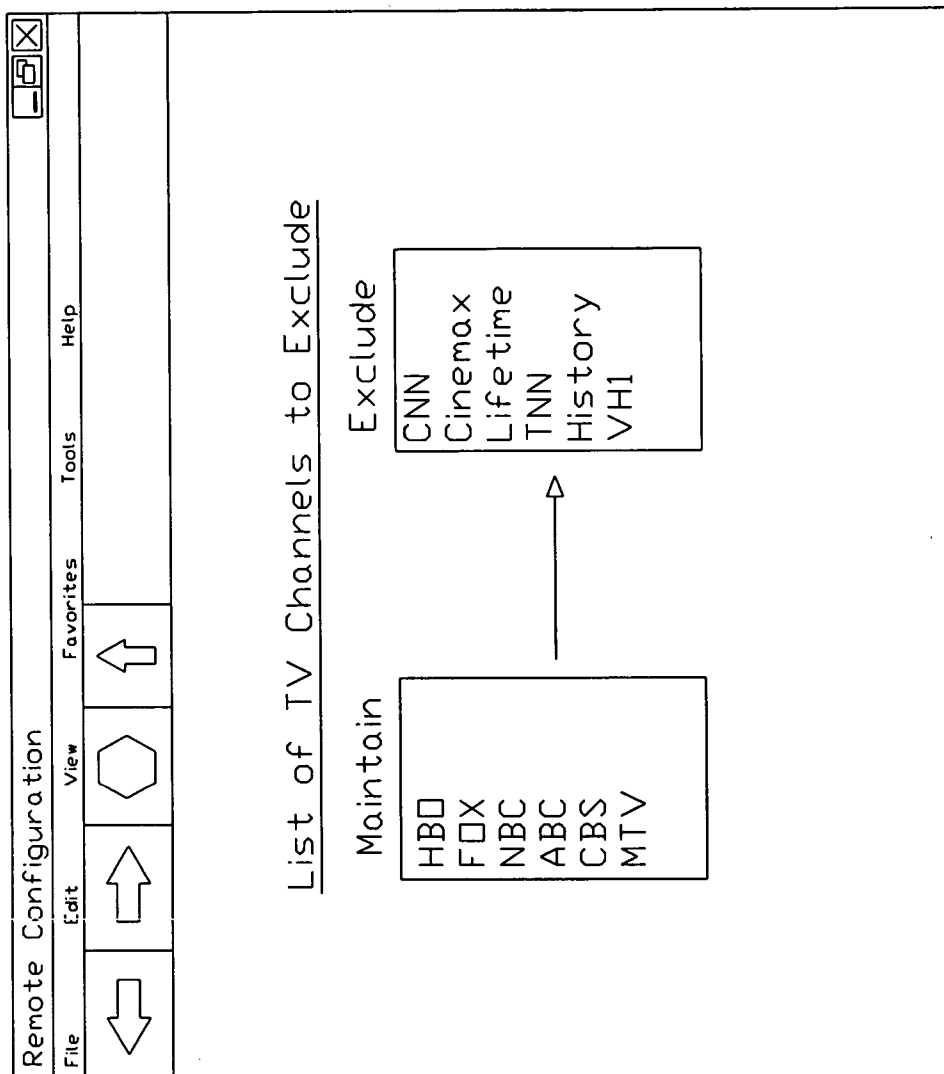


FIG. 14

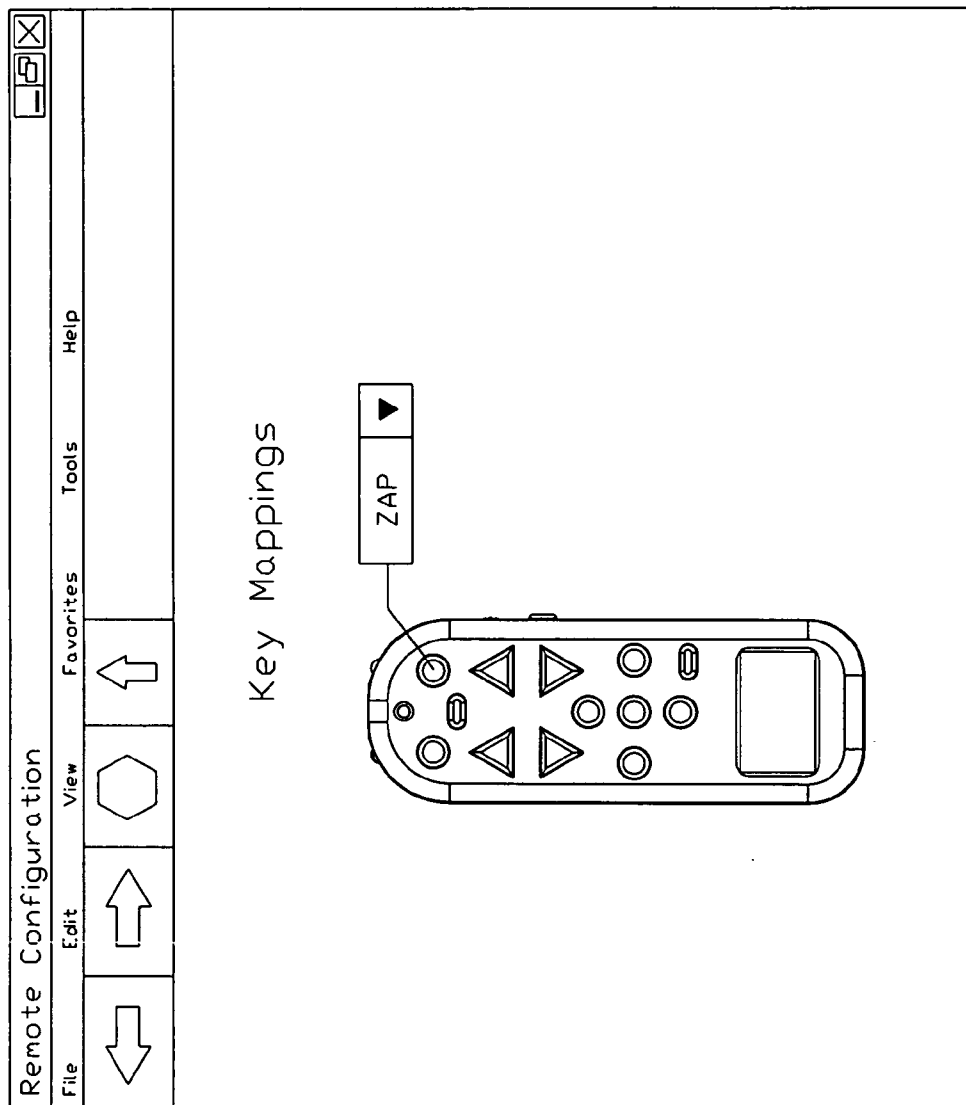


FIG. 15

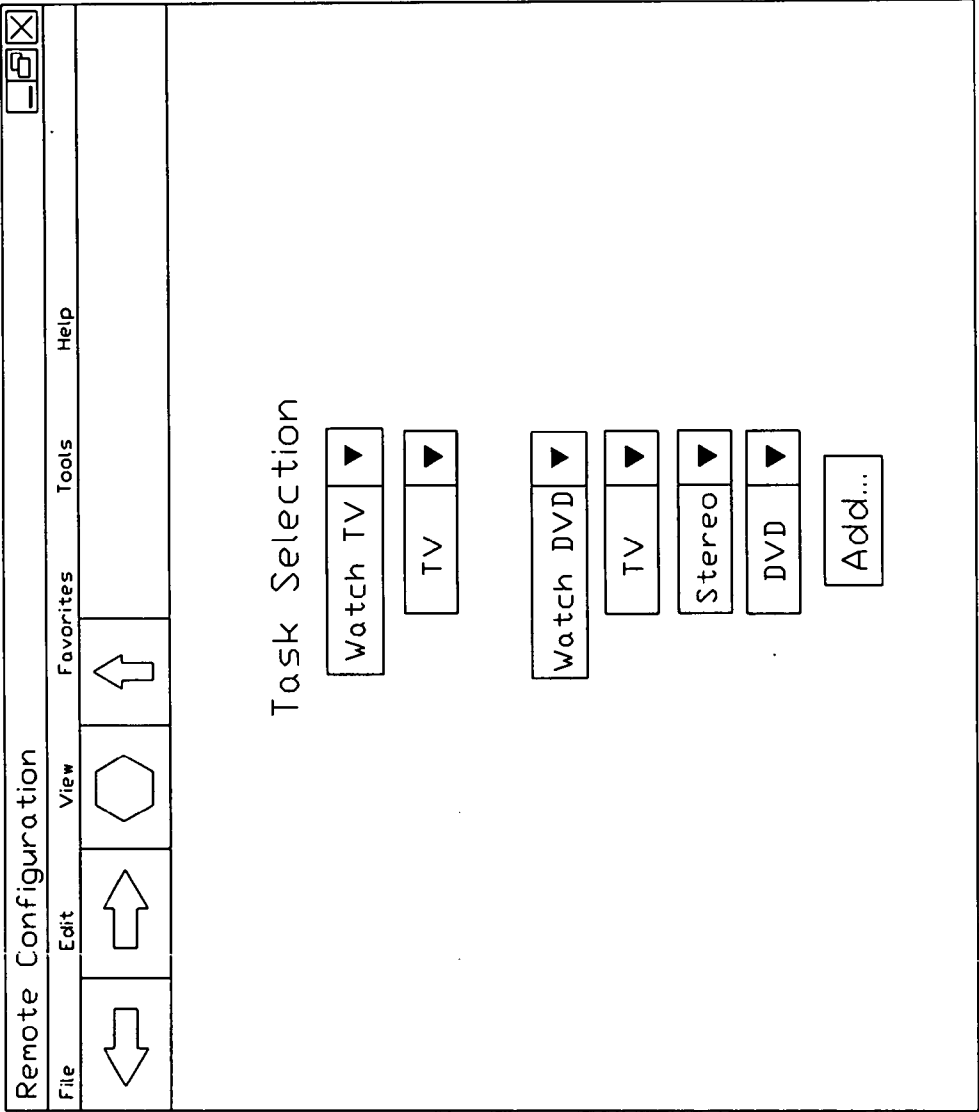


FIG. 16

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ONLINE REMOTE CONTROL CONFIGURATION SYSTEM

CROSS-REFERENCE TO RELATED U.S. PATENT APPLICATIONS

[0001] I hereby claim benefit under Title 35, United States Code, Section 120 of U.S. application Ser. No. 09/804,623 filed Mar. 12, 2001 which is a continuation of U.S. Provisional Application No. 60/189,487 filed Mar. 15, 2000. This application is a continuation of the Ser. No. 09/804,623 application and the No. 60/189,487 application. The Ser. No. 09/804,623 application and No. 60/189,487 application are hereby incorporated by reference into this application.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates generally to universal remote control devices and more specifically it relates to an online remote control configuration system for efficiently programming a remote control to control a plurality of external electronic devices.

[0004] 2. Description of the Prior Art

[0005] Remote control devices have been in use for years. Remote control devices are utilized to operate various external electronic devices including but not limited to televisions, stereos, receivers, VCRs, DVD players, CD players, amplifiers, equalizers, tape players, cable units, lighting, window shades and other electronic devices. A conventional remote control is typically comprised of a housing structure, a keypad within the housing structure for entering commands by the user, electronic circuitry within the housing structure connected to the keypad, and a transmitter electrically connected to the electronic circuitry for transmitting a control signal to an electronic device to be operated.

[0006] The user depresses one or more buttons upon the keypad when a desired operation of a specific electronic device is desired. For example, if the user desires to turn the power off to a VCR, the user will depress the power button upon the remote control which transmits a "power off" control signal that is detected by the VCR resulting in the VCR turning off.

[0007] Because of the multiple electronic devices currently available within many homes and businesses today, a relatively new type of remote control is utilized to allow for the control of a plurality of electronic devices commonly referred to as a "universal remote control." Most universal remote controls have "selector buttons" that are associated with the specific electronic device to be controlled by the remote control (e.g. television, VCR, DVD player, etc.). Universal remote control devices allow for the control of a plurality of external electronic devices with a single remote control thereby eliminating the need to have a plurality of remote controls physically present within a room.

[0008] Conventional universal remote controls are typically programmed using two methods: (1) entering an "identifier code" directly into the remote control, or (2) sampling the control signal transmitted by another remote control device. Neither method of programming a universal remote control is efficient and causes many consumers to either not

purchase a universal remote control or abandon the usage of an already purchased remote control.

[0009] Entering identifier codes into a remote control can be time consuming and difficult for many users. If the user loses the "code book" that comes with the universal remote control they are often times left with a useless universal remote control that they are unable to reprogram. Often times a consumer is given 4-8 different "possible" identifier codes for a particular brand of electronic device thereby requiring the user to, through trial and error, determine the correct identifier code. Sometimes an individual believes they have entered the proper identifier code since one or two of the commands on the keypad work only to find out later that one or more commands do not work with the electronic device since the proper identifier code was not entered.

[0010] Also, sampling of control signals is very time consuming and difficult to ensure proper sampling. An individual must expend significant amounts of time sampling infrared signals from another remote control and "saving" these signals within the universal remote control thereafter assigning the particular signal to a button on the keypad. This is very labor intensive and the results are only as stable as the infrared code sampled.

[0011] There are many problems with conventional universal remote controls. For example, many universal remote controls have a plurality of buttons wherein many are never utilized since the manufacturer attempts to have physical buttons for each possible command of each possible electronic device. Another problem conventional universal remote controls is that the electronic components within these devices is relatively complex and expensive to manufacture resulting in an increased cost to the consumer.

[0012] While these devices may be suitable for the particular purpose to which they address, they are not as suitable for efficiently programming a remote control to recognize a plurality of external electronic devices. Conventional universal remote control devices do not allow for easy and quick programming thereof. In addition, conventional universal remote controls are not always properly programmed thereby causing consumer dissatisfaction.

[0013] In these respects, the online remote control configuration system according to the present invention substantially departs from the conventional concepts and designs of the prior art, and in so doing provides an apparatus primarily developed for the purpose of efficiently programming a remote control to recognize a plurality of external electronic devices.

SUMMARY OF THE INVENTION

[0014] In view of the foregoing disadvantages inherent in the known types of universal remote controls now present in the prior art, the present invention provides a new online remote control configuration system construction wherein the same can be utilized for efficiently programming a remote control to recognize a plurality of external electronic devices.

[0015] The general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new online remote control configuration system that has many of the advantages of the universal remote control devices mentioned heretofore and many novel fea-

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tures that result in a new online remote control configuration system which is not anticipated, rendered obvious, suggested, or even implied by any of the prior art remote controls, either alone or in any combination thereof.

[0016] To attain this, the present invention generally comprises a remote control having a housing, a keypad, and an electronic system for receiving configuration data from a control station via a global computer network (e.g. Internet). The user preferably “samples” one or more signals from a remote control into the electronic system and then uploads the samples to the control station. The control station analyzes the uploaded samples and transmits the appropriate configuration data to properly configure the electronic system. The user may also access a web site of the control station and manually select each of the external electronic devices that the remote control is to operate after which the control station sends the appropriate configuration data to the electronic system.

[0017] There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the invention that will be described hereinafter and that will form the subject matter of the claims appended hereto.

[0018] In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of the description and should not be regarded as limiting.

[0019] A primary object of the present invention is to provide an online remote control configuration system that will overcome the shortcomings of the prior art devices.

[0020] A second object is to provide an online remote control configuration system for efficiently programming a remote control to recognize a plurality of external electronic devices.

[0021] Another object is to provide an online remote control configuration system that allows for a simple electronic configuration.

[0022] An additional object is to provide an online remote control configuration system that does not require a universal remote control to store hundreds of different signal codes that are never utilized.

[0023] A further object is to provide an online remote control configuration system that allows an individual to quickly configure a universal remote control.

[0024] A further object is to provide an online remote control configuration system that is able to upload a relatively complex configuration (e.g. “watch television”) than is currently possible with current universals.

[0025] A further object is to provide an online remote control configuration system that allows customization of a

remote control but for the specific system in which they are interconnected (e.g. so that they are effectively a system).

[0026] A further object is to provide an online remote control configuration system that can be configured to how the user desires to utilize electronic devices.

[0027] Other objects and advantages of the present invention will become obvious to the reader and it is intended that these objects and advantages are within the scope of the present invention.

[0028] To the accomplishment of the above and related objects, this invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that changes may be made in the specific construction illustrated and described within the scope of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] Various other objects, features and attendant advantages of the present invention will become fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views, and wherein:

[0030] FIG. 1 is an upper perspective view of the present invention.

[0031] FIG. 2 is a side view of the present invention.

[0032] FIG. 3 is a side view of the present invention illustrating electronic circuitry within.

[0033] FIG. 4 is a block diagram illustrating the communications between the present invention and a plurality of external electronic devices.

[0034] FIG. 5 is a block diagram illustrating the electronic system of the present invention electrically connected to the power source and in communication with the external electronic devices.

[0035] FIG. 6 is a block diagram illustrating the electronic system along with a plurality of accessory devices connected to thereof.

[0036] FIG. 7 is a block diagram of the present invention in communication with the control station via a global computer network wherein the electronic system is directly connected to an intermediary computer system.

[0037] FIG. 8 is a block diagram of the present invention in communication with the control station directly via a global computer network without utilizing an intermediary computer system.

[0038] FIG. 9 is a flowchart illustrating the overall operation of the present invention from sampling the signal code of each remote control to downloading the configuration data.

[0039] FIG. 10 is a flowchart illustrating the functionality within the control station for identifying each electronic device.

[0040] FIG. 11 is a flowchart illustrating the usage of a web page to allow a user to directly enter the identity of each electronic device into the control station.

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[0041] FIG. 12 is an illustration of a web page for entering electronic device information into.

[0042] FIG. 13 is an illustration of a web page displaying the connection of external electronic devices.

[0043] FIG. 14 is an illustration of a web page displaying the selection of channels to include and exclude from the electronic system configuration.

[0044] FIG. 15 is an illustration of a web page showing the key mappings upon the keypad as configured.

[0045] FIG. 16 is an illustration of a web page showing the setup of various tasks such as "Watch Television" and "Watch DVD."

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0046] The following description is presented to enable any person skilled in the art to make and use the invention, and is provided in the context of a particular application and its requirements. Various modifications to the disclosed embodiments will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the present invention. Thus, the present invention is not intended to be limited to the embodiments shown, but is to be accorded the widest scope consistent with the principles and features disclosed herein.

[0047] The data structures and code described in this detailed description are typically stored on a computer readable storage medium, which may be any device or medium that can store code and/or data for use by a computer system. This includes, but is not limited to, magnetic and optical storage devices such as disk drives, magnetic tape, CDs (compact discs) and DVDs (digital video discs), and computer instruction signals embodied in a transmission medium (with or without a carrier wave upon which the signals are modulated). For example, the transmission medium may include a communications network, such as but not limited to the Internet or wireless communications.

[0048] Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, FIGS. 1 through 16 illustrate an online remote control configuration system 10, which comprises a remote control having a housing, a keypad, and an electronic system for receiving configuration data from a control station via a global computer network (e.g. Internet). The user preferably "samples" one or more signals from a remote control into the electronic system and then uploads the samples to the control station. The control station analyzes the uploaded samples and transmits the appropriate configuration data to properly configure the electronic system. The user may also access a web site of the control station and manually select each of the external electronic devices that the remote control is to operate after which the control station sends the appropriate configuration data to the electronic system. The user can also specify how the devices are connected and the configuration can be transferred to the electronic system 100 from the control station 40.

[0049] A. Remote Control Structure

[0050] The present invention generally is comprised of a housing 20 having a structure and shape similar to conventional remote control devices. The housing 20 may be constructed of various types of materials and shapes as can be appreciated by one skilled in the art. The housing is preferably structured to be ergonomic for a majority of users.

[0051] The present invention may be utilized to control and operate various external electronic devices including but not limited to televisions, stereos, receivers, VCRs, DVD players, CD players, amplifiers, equalizers, tape players, cable units, satellite dish receivers, lighting, window shades and other electronic devices. Almost any number of external electronic devices may be controlled by the present invention as can be accomplished with conventional remote control devices.

[0052] FIG. 6 is a block diagram of an exemplary electronic system 100 for practicing the various aspects of the present invention. The electronic system 100 is preferably enclosed within the housing. A portable power source 140 is electrically connected to the electronic system 100 for providing electrical power to the electronic system 100. The power source 140 may be comprised of any power source such as a battery structure (disposable or rechargeable), solar cells, or direct power.

[0053] The electronic system 100 preferably includes a display screen 104, a network interface 112, a keypad 114, a microprocessor 116, a memory bus 118, random access memory (RAM) 120, a speaker 102, read only memory (ROM) 122, a peripheral bus 124, a keypad controller 126, and a communications device 108. As can be appreciated, the electronic system 100 of the present invention may be comprised of any combination of well-known computer devices, personal digital assistants (PDAs), laptop computers, remote control devices and other electronic systems.

[0054] The microprocessor 116 is a general-purpose digital processor that controls the operation of the electronic system 100. Microprocessor 116 can be a single-chip processor or implemented with multiple components. Using instructions retrieved from memory, microprocessor 116 controls the reception and manipulations of input data and the output and display of data on output devices.

[0055] The memory bus 118 is utilized by microprocessor 116 to access RAM 120 and ROM 122. RAM 120 is used by microprocessor 116 as a general storage area and as scratchpad memory, and can also be used to store input data and processed data. ROM 122 can be used to store instructions or program code followed by microprocessor 116 as well as other data.

[0056] Peripheral bus 124 is used to access the input, output and storage devices used by the electronic system 100. In the described embodiment(s), these devices include a display screen 104, an accessory device 106, a speaker 102, a communications device 108, and a network interface 112. A keypad controller 126 is used to receive input from the keypad 114 and send decoded symbols for each pressed key to microprocessor 116 over bus 128.

[0057] The display screen 104 is an output device that displays images of data provided by the microprocessor 116 via the peripheral bus 124 or provided by other components

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in the electronic system **100**. Other output devices such as a printer, plotter, typesetter, etc. can be utilized as an accessory device **106**.

[0058] The microprocessor **116** together with an operating system operate to execute computer code and produce and use data. The computer code and data may reside on RAM **120**, ROM **122**, or other storage mediums. The computer code and data could also reside on a removable program medium and loaded or installed onto the electronic system **100** when needed. Removable program mediums include, for example, PC-CARD, flash memory, and floppy disk.

[0059] The network interface **112** is utilized to send and receive data over a network connected to other electronic systems. The network interface may also be comprised of a Universal Serial Bus (USB), an external bus standard that supports data transfer rates of 12 Mbps (12 million bits per second). A single USB port can be used to connect up to 127 peripheral devices, such as mice, modems, and keyboards. An interface card or similar device and appropriate software implemented by microprocessor **116** can be utilized to connect the electronic system **100** to an existing network and transfer data according to standard protocols including data over a global computer network such as the Internet. The electronic system **100** may connect to the Internet **130** via a computer system **60** or directly as illustrated in FIGS. 7 and 8 respectively.

[0060] The keypad **114** is used by a user to input commands and other instructions to the electronic system **100**. Other types of user input devices can also be used in conjunction with the present invention. For example, pointing devices such as a computer mouse, a jog switch **22**, a track ball, a stylus, or a tablet to manipulate a pointer on a screen of the electronic system **100**.

[0061] The present invention can also be embodied as computer readable code on a computer readable medium. The computer readable medium is any data storage device that can store data which can be thereafter be read by a electronic system. Examples of the computer readable medium include read-only memory, random-access memory, magnetic data storage devices such as diskettes, and optical data storage devices such as CD-ROMs. The computer readable medium can also be distributed over a network coupled electronic systems so that the computer readable code is stored and executed in a distributed fashion.

[0062] The communications device **108** may be comprised of any well-known communication system that allows communications with external electronic devices. The communications device **108** may provide for various types of communication such as but not limited to via infrared (IR), wireless (e.g. BLUETOOTH), unidirectional, bi-directional, radio frequency (RF), visible light, ultrasonic and various other means for communicating with external electronic devices. The communications device **108** is capable of receiving a "signal sample" from another remote control wherein the signal sample is stored within the electronic system.

[0063] Input into the electronic system is accomplished mainly through the usage of the keypad **114**. The keypad **114** includes a plurality of buttons that allow the user to execute one or more commands. The keypad **114** allows for the control of basic functions such as volume, channel manipu-

lation, mute, and last channel. Various other input devices may be utilized to input data into the electronic system **100** such as a jog switch **22** (e.g. dial), motion and orientation detectors, touch sensitive screens and voice recognition. The display **104** provides information to the user such as possible tasks to complete or the current state of the external electronic devices.

[0064] B. Communication System

[0065] The present invention is best operated upon a global computer network such as the Internet **130**. A plurality of computer systems around the world are in communication with one another via this global computer network.

[0066] The present invention preferably utilizes the Internet **130** for communications, however it can be appreciated that as future technologies are created that various aspects of the invention may be practiced with these improved technologies. In addition, wireless technologies provide a suitable communications medium for operating the present invention.

[0067] C. Web Page

[0068] The present invention is preferably utilized in conjunction with information presented upon a web page or other displayable medium representing the control station **40**. A web page is typically comprised of a web page code that is stored upon a computer server. A typical web page includes textual, graphical and audio data within for display upon a computer system **60** and may be comprised of various formats.

[0069] The web page code may be formatted such as but not limited to HTML (Hyper-Text Markup Language), XML (Extensible Markup Language), HDML (Handheld Device Markup Language), and WML (Wireless Markup Language) that is displayable upon a computer system. Scripts such as JavaScript may be included within the web page code to request the server computer to request a specific audio file to be played with respect to an advertisement. As can be appreciated, additional formats for the web page code may be utilized as developed.

[0070] The web page code is retrieved by a computer system **60** or electronic system **100** via the Internet, wireless network or other communications channel utilizing a conventional web browser such as but not limited to NETSCAPE or MICROSOFT INTERNET EXPLORER. An individual using the computer system **60** enters the URL (Uniform Resource Locator) identifying the web page to retrieve the web page code associated with the desired web page.

[0071] As shown in FIG. 12 of the drawings, at least one of the web pages associated with the control station **40** allows for the direct entry of the device identification. More particularly, information relating to the type, brand and model of the device are preferably entered into the web page that are thereafter forwarded to the control station **40** for determination of the configuration data. Various other designs of web pages may be utilized to receive the device data as can be appreciated by one skilled in the art. FIG. 13 discloses a direct entry of the device connections. The device connections can be specified/represented graphically, through dropdown lists or other configurations.

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[0072] D. Control Station

[0073] The control station 40 is in communication with the Internet 130 via various well-known means. The control station 40 is preferably accessed by users via a web page which allows the users to identify themselves and modify user settings. The user may input various conditions and requirements regarding the external electronic devices 12 that the remote control is to control. The user settings may be modified at anytime via the web page or other means.

[0074] The control station 40 is in communication with one or more programming stations 50 that provide updated electronic device information to the control station 40. The electronic device information is basically comprised of product information, type, brand, model, year, communication type, and signal configuration data. It can be appreciated that additional types of electronic device information may be received and stored by the control station 40.

[0075] The control station 40 maintains a database that allows for the determination of an electronic device by one or more signal samples from the corresponding remote control. The control station maintains a database that allows for the determination of what inputs and outputs are on the electronic devices 12, and the mechanism for transferring between states. The control station 40 is preferably updated at periodic intervals regarding updated information regarding new electronic devices on the market.

[0076] E. Sampling Mode

[0077] The preferred method of operating the present invention is to "sample" the signal emitted from a remote control corresponding to the electronic device 12 to be controlled. Prior to sampling the signal, the user may select a "sample button" which will place the electronic system in "sample mode" for receiving one or more sample signals per remote control. Signal sampling has been performed within the remote control industry for years and is well known to those skilled in the art particularly with infrared signal sampling. No further discussion of signal sampling is required as the same is readily apparent in the art.

[0078] Prior to sampling the signal, the user positions the communication device 108 of the electronic system 100 in a location to detect and receive the signal from the remote control. Though not required, the user typically will select a button on the keypad 114 identifying the button they plan to press on the remote control prior to depressing. For example, if the user is going to sample the "power on/off signal" from the remote control, the user would select the "power button" or other appropriate button on the keypad 114 during sampling mode.

[0079] After identifying to the electronic system 100 what button on the remote control will be depressed, the user then depresses the desired button on the remote control thereby transmitting the signal to the communication device 108 which receives the signal as shown in FIG. 9 of the drawings. The signal is then converted and forwarded by the communication device 108 to the memory 120 of the electronic system 100 for storage. It can be appreciated that if the electronic system 100 is connected to the global computer network 130 that the sample signals do not need to be stored within the electronic system 100. Additional samples may be taken from the remote control or another remote control may be sampled.

[0080] F. Uploading Sampled Signals

[0081] As shown in FIGS. 9 and 10 of the drawings, after the desired signals have been sampled the user connects the electronic system 100 to the Internet via the network interface 112, the communication device 108 or other means. The electronic system 100 may be directly or indirectly connected to the Internet as shown in the figures. The user then uploads the "sample data" to the control station 40.

[0082] As shown in FIG. 10 of the drawings, the control station 40 analyzes the sample data to determine the type, brand and model of each of the electronic devices 12 that are controlled by the corresponding sampled signal. Once the control station 40 has determined what the type, brand and model of each of the electronic devices 12 is, the control station 40 then generates "configuration data" that is then downloaded to the electronic system 100. The configuration data configures the electronic system so that it is able to control all of the external electronic devices 12 as a universal remote control would. The user then utilizes the programmed remote control similar to a universal remote control. It is noted that the control system may prompt the user for additional information that may be utilized to create a personalized configuration.

[0083] G. Direct Configuration

[0084] As shown in FIGS. 11 and 12 of the drawings, the user may avoid sampling the signal from each of the remote controls and instead directly enter product information into the web page of the control station 40. The user preferably enters relevant product information such as but not limited to device type (e.g. VCR, television, DVD player, etc.), brand (e.g. SONY, TOSHIBA, etc.), and model.

[0085] Once the all of the device information has been entered for each of the electronic devices 12, the user then connects the electronic system 100 to the Internet via the network interface 112, the communication device 108 or other means. The electronic system 100 may be directly or indirectly connected to the Internet as shown in the figures.

[0086] Once the control station 40 has determined what the type, brand and model of each of the electronic devices 12 is, the control station 40 then generates "configuration data" that is then downloaded to the electronic system 100. The configuration data configures the electronic system so that it is able to control all of the external electronic devices 12 as a universal remote control would. The user then utilizes the programmed remote control similar to a universal remote control.

[0087] As electronic devices are added to or removed from the user's electronic system, they can update their device information at the control station 40 via the usage of an uploaded signal sample or directly through the web page. The user is able to utilize the remote control as a conventional remote for all of their electronic devices 12 without interruption.

[0088] As to a further discussion of the manner of usage and operation of the present invention, the same should be apparent from the above description. Accordingly, no further discussion relating to the manner of usage and operation will be provided.

[0089] With respect to the above description then, it is to be realized that the optimum dimensional relationships for

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the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed to be within the expertise of those skilled in the art, and all equivalent structural variations and relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

[0090] Therefore, the foregoing is considered as illustrative only of the principles of those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

We claim:

1. An remote control configuration system, comprising:
a control station for providing configuration data;
a housing;
an electronic system capable of storing sample signal data relating to at least one electronic device and remote control;
a communication device connected to said electronic system for receiving said sample signal data;
a means for communicating with said control station; and
an input means connected to said electronic system.
2. The remote control configuration system of claim 1, wherein said input means comprises a keypad.
3. The remote control configuration system of claim 2, wherein said sample signal data is comprised of at least one infrared signal.
4. The remote control configuration system of claim 1, wherein said means for communicating with said control station is comprised of a global computer network.
5. The remote control configuration system of claim 4, wherein said control station includes a web page for receiving electronic device information.
6. The remote control configuration system of claim 1, wherein said control station includes a web page for receiving electronic device information.
7. A method of using a remote control configuration system having an electronic system with a communication device, an input device, and a means for communicating with a control station, said method comprising the steps of:
 - (a) sampling a signal sample from a remote control;
 - (b) storing said signal sample within said electronic system into a sample storage;
 - (c) repeating steps (a) and (b) for additional remote controls;

- (d) uploading said sample storage to said control station;
 - (e) determining an identity of a remote control that corresponds with each said signal sample of said sample storage; and
 - (f) generating a configuration data for said electronic system that allows said electronic system to mimic each remote control sampled.
8. The method of using a remote control configuration system of claim 7, including the step of:
 - (g) transferring said configuration data to said electronic system.
 9. The method of using a remote control configuration system of claim 8, including the step of:
 - (h) storing said configuration data within said electronic system.
 10. The method of using a remote control configuration system of claim 9, including the step of:
 - (i) generating a signal to control an electronic device based upon said configuration data.
 11. A method of using a remote control configuration system having an electronic system with a communication device, an input device, and a means for communicating with a control station, said method comprising the steps of:
 - (a) accessing a web page of said control station;
 - (b) inputting device data regarding an electronic device;
 - (c) repeating steps (a) and (b) for additional electronic devices; and
 - (d) generating a configuration data for said electronic system that allows said electronic system to mimic a remote control for each electronic device.
 12. The method of using a remote control configuration system of claim 11, including the step of:
 - (e) transferring said configuration data to said electronic system.
 13. The method of using a remote control configuration system of claim 12, including the step of:
 - (f) storing said configuration data within said electronic system.
 14. The method of using a remote control configuration system of claim 13, including the step of:
 - (g) generating a signal to control an electronic device based upon said configuration data.

* * * * *

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(54) **SYSTEM OF AND METHOD FOR CONFIGURING AN AUTOMATIC APPLIANCE**

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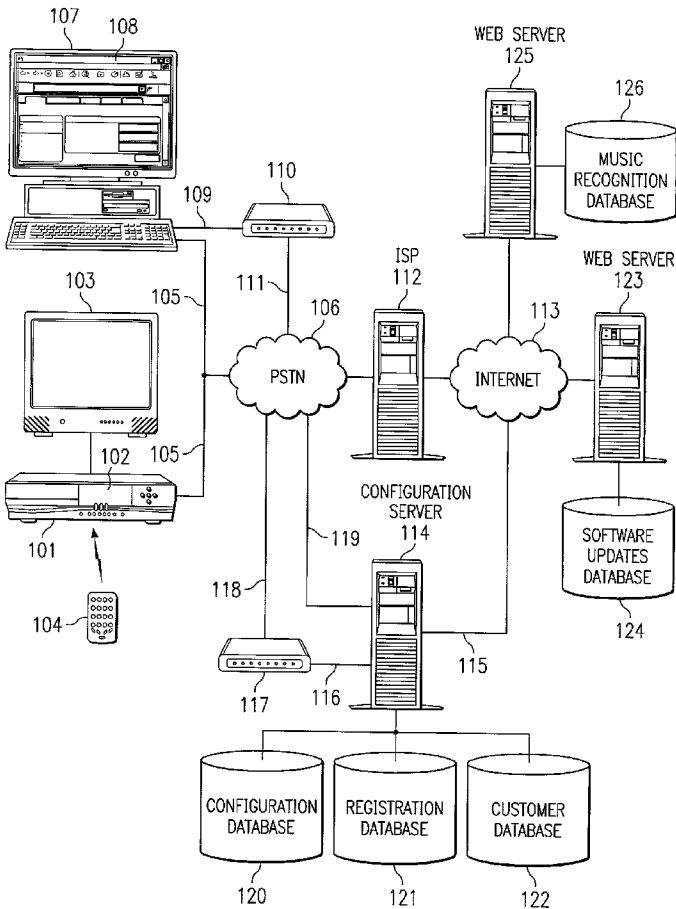
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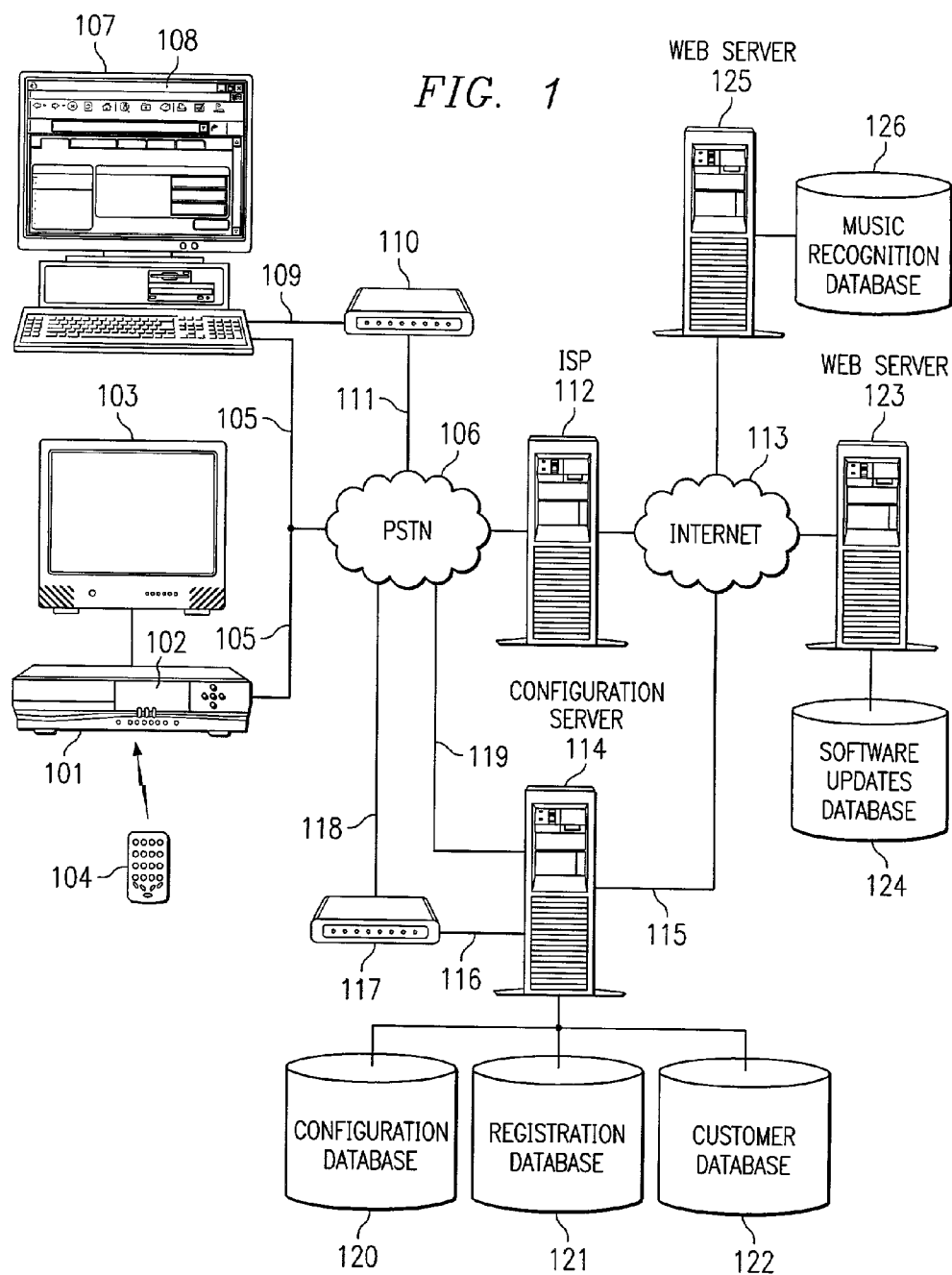
(51) **Int. Cl.⁷** **H04M 11/00**
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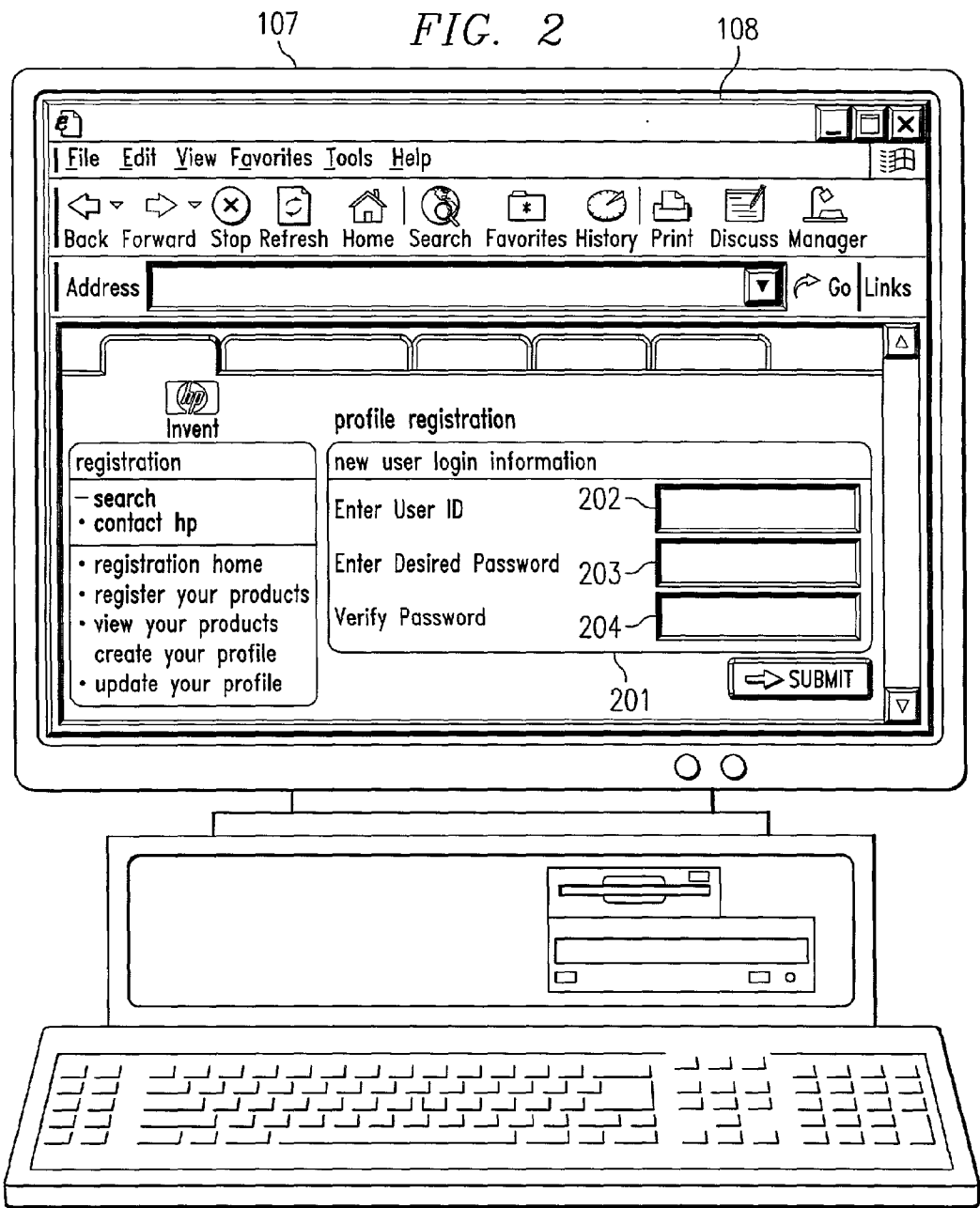
(57) **ABSTRACT**

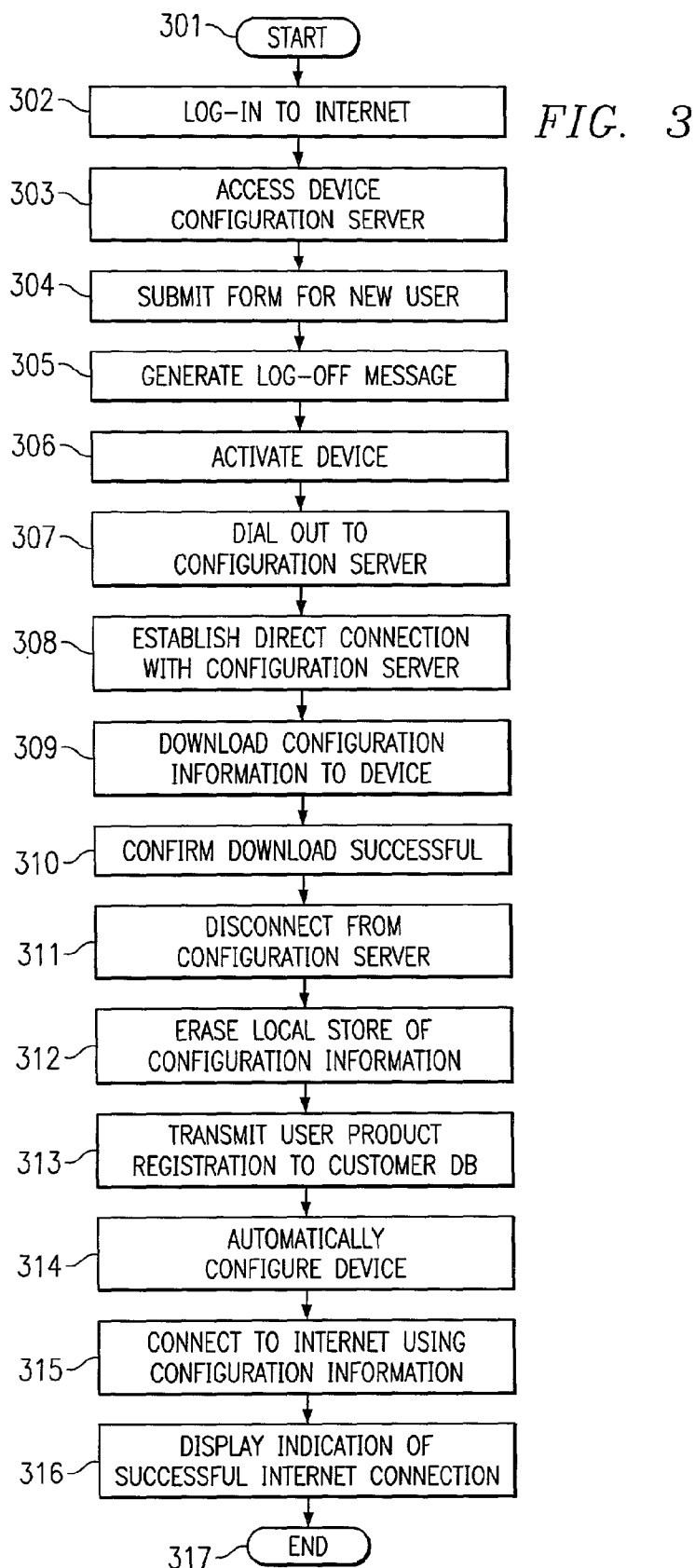
A configuration server comprises a web server connected to an Internet and hosting a registration webpage accessible to

a registrant on the Internet, the registration webpage including an input area receiving configuration information from the registrant, a configuration database connected to the web server for storing the configuration information, and a direct-dial interface connected to a telephone line and to the configuration database, the direct-dial interface operational to answer an incoming telephone call from an automatic appliance and, in response, transmit the configuration information to the automatic appliance. An automatic appliance configuration registration system comprises (a) an automatic appliance including a memory for storing configuration information for automatically configuring the automatic appliance, and (b) a remote configuration server interface operational to answer an incoming call from the automatic appliance and, in response, transmit the configuration information to the automatic appliance, the remote configuration server comprising (i) a web server connected to an Internet and hosting a registration webpage accessible to a registrant on the Internet, the registration webpage including an input area receiving the configuration information from the registrant; and (ii) a configuration database connected to the web server for storing the configuration information.









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SYSTEM OF AND METHOD FOR CONFIGURING AN AUTOMATIC APPLIANCE

TECHNICAL FIELD

[0001] The present invention relates to automatic appliances and similar devices with embedded processors requiring access to the Internet and, in particular, a system of and method for configuring an automatic appliance.

BACKGROUND OF THE INVENTION

[0002] Increases in performance and reductions in prices continue to enhance the popularity of personal computers (PCs) in the home and business. Along with PCs, the Internet has provided connectivity between and among computer users at all corners of the world. At the same time, basic functions once only included in full-fledged computers are now incorporated into a wide range of devices which, when provided with access to the Internet, are sometimes called "Internet appliances" or "automatic appliances." While such computing and data access capabilities are available in high-end devices, these capabilities are being increasingly incorporated into greater numbers of devices including home electronics and appliances. For example, in the case of the former, many home entertainment systems are micro-processor-based and include provisions for connecting to various communications networks. Home security systems may include a dialer programmed to dial a central monitoring service upon detection of an event, such as an attempted break-in or fire. Similarly, high-end entertainment systems may include communications facilities for connecting to the Internet.

[0003] To enable such automatic appliances to access available communications media such as the Internet, the user must typically configure the appliance with the appropriate settings used to establish communications on the network. In the case of an auto-dialer, a pre-programmed telephone number may be selected so that the appliance may dial-out to an appropriate server or service bureau. However, in the case of more complex networks such as the Internet, a greater amount of data may be required to provide information concerning, for example, Internet Service Provider (ISP) identity (e.g., IP address of the ISP server), user account information (e.g., name, e-mail address, password, etc.), communications type and protocol (e.g., dial-up "Plain Old Telephone Service" (POTS) connectivity, broadband Digital Subscriber Line (DSL), cable modem, etc.) and other parameters used to connect with the Internet. Typically, this information may be input by the user using a remote control device, the automatic appliance itself having no keyboard. Using the remote control, the user often connects a monitor such as a television to the automatic appliance and steps through a hierarchical menu of selections to configure the appliance. This may be often an error-prone and tedious process.

SUMMARY OF THE INVENTION

[0004] Accordingly, a need exists for a simple and error-free method and system for initializing and/or configuring an Internet or automatic appliance.

[0005] According to one embodiment of the present invention, a configuration server comprises a web server connected to an Internet and hosting a registration webpage

accessible to a registrant on the Internet, the registration webpage including an input area receiving configuration information from the registrant, a configuration database connected to the web server for storing the configuration information, and a direct-dial interface connected to a telephone line and to the configuration database, the direct-dial interface operational to answer an incoming telephone call from an automatic appliance and, in response, transmit the configuration information to the automatic appliance.

[0006] According to another embodiment of the present invention, an automatic appliance configuration registration system comprises (a) an automatic appliance including a memory for storing configuration information for automatically configuring the automatic appliance, and (b) a remote configuration server interface operational to answer an incoming call from the automatic appliance and, in response, transmit the configuration information to the automatic appliance, the remote configuration server comprising (i) a web server connected to an Internet and hosting a registration webpage accessible to a registrant on the Internet, the registration webpage including an input area receiving the configuration information from the registrant; and (ii) a configuration database connected to the web server for storing the configuration information.

[0007] According to another embodiment of the present invention, an automatic appliance comprises a first communication interface configured to establish data communications with a remote server on a first communications network to receive configuration information, a memory configured to receive and store the configuration information, and a second communication interface made operational in response to the configuration information for providing access to a second communications network.

[0008] According to yet another embodiment of the present invention, a method of configuring an automatic appliance comprises receiving configuration information from a client, storing the configuration information in a memory, accessing the memory with the automatic appliance operating in an initialization mode, downloading the configuration information from the memory to the automatic appliance operating in the initialization mode, automatically configuring a communications interface of the automatic appliance with the configuration information, and connecting to a remote server with the communications interface.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a block diagram of a registration and configuration system supporting initialization configuration and operation of an automatic appliance according to an embodiment of the invention;

[0010] FIG. 2 is a screen presentation representative of a browser displaying a registration form used to provide configuration information to a configuration server according to an embodiment of the invention; and

[0011] FIG. 3 is a flowchart of a method of configuring an automatic appliance according to an embodiment of the invention.

DETAILED DESCRIPTION

[0012] A preferred embodiment of the present invention avoids user programming of an automatic appliance using

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the typically limited capabilities supported by the appliance itself in the form of panel-mounted input switches and/or a remote control device. Instead, a user may input required configuration information using, for example, a Personal Computer (PC) connected to the Internet. With the PC the user accesses a web site and uploads required configuration information to a remote server. After the configuration information is uploaded, the automatic appliance operating an initialization mode accesses the remote server using, for example, a preprogrammed 800 telephone number, and downloads the configuration information. The configuration information may be used by the automatic appliance to configure itself and, for example, obtain communication access to the Internet via an appropriate Internet Service Provider (ISP).

[0013] Referring to FIG. 1, an automatic appliance 101 may include, for example, the Hewlett Packard Company (HP) de100c Digital Entertainment Center or "DEC". Considered a prototype of future consumer music appliances and other types of Internet and automatic appliances, DEC focuses advanced computing power on its purpose as a single-function appliance. In DEC's current embodiment it is an advanced network connected juke box. DEC may be a stand-alone appliance, including facilities to enable downloading from the Internet both music and data relating to music (e.g., artist information, lyrics, etc.) contemporaneously and/or previously stored on the system. The system further enables viewing of information about the current track and artist as downloaded from an Internet-accessible music recognition service having an appropriate music information database. The system further includes facilities for including play lists, organizing a music collection, locating Internet radio stations and setting up radio favorites. A front-panel vacuum fluorescent display (VFD) readout enables use of the system without turning on or connecting it to a TV. Thus, in normal use, the system functions in a stand-alone mode. The user may also interact with the system using an infrared remote control device in addition to front panel mounted controls.

[0014] DEC includes a processor, memory and a hard drive, a telephone modem, various data ports, and video and audio input and outputs. Also included may be integral alphanumeric display 102 comprising a front-panel VFD. One of the video interfaces may be used to connect television monitor 103 to provide enhanced display capabilities, such as for reviewing play lists and viewing video media playable on or downloaded to automatic appliance 101. DEC further includes a Compact Disc (CD) player, which reads and plays back audio recorded in a Pulse Code Modulation (PCM) format and digital music in a Moving Picture Experts Group Audio Layer 3 format (MP3) using a standard perceptual coding technique for compressing audio information.

[0015] Note that, although DEC maybe used in the present description of an embodiment of the present invention, it may be but one example of an appliance that may take advantage of the present invention.

[0016] Automatic appliance 101 preferably connects to dial-up telephone line 105 of a switched telephone network (e.g., the public switched telephone network or "PSTN") via an internal "telephone line" type modem (not shown), supporting standard POTS dial modem protocols, including the

BELL, CCITT, ITU-T, and CCITT/ITU-T protocols. In addition, the Ethernet port (not shown) may be used to connect to a broadband media via an appropriate modem to provide broadband connectivity using, for example, DSL, cable modem, TI etc.

[0017] Dial-up telephone line 105 provides connectivity to Public Switched Telephone Network (PSTN) 106. Also connected to dial-up telephone line 105 may be PC 107 used by a registrant to access and display registration web page 108. In addition to dial-up telephone line 105, PC 107 may also be provided with broadband connection 111, such as DSL, using ethernet 109 to connect to DSL modem 110. Broadband connection 111 may be routed through switching facilities of PSTN 106 to an appropriate router or gateway to provide direct connectivity with a packet switching network such as the Internet.

[0018] PSTN 106 connects to ISP 112 to provide dial-up access to Internet 113. In addition, PSTN access may also be provided via telephone lines or trunks 118 to configuration server 114 via modem bank 117 and ethernet connection 116 or similar data connection. Alternatively, other forms of connectivity between PSTN 106 and configuration server 114 may be provided as represented by connection 119 including, for example, Integrated Services Digital Network (ISDN), DSL, and other interfaces compatible with dial-up access of configuration server 114. Thus, one portion of configuration server 114 comprises dial-up capabilities supported by an appropriate communications interface in the form of a direct-dial interface. The direct-dial interface supports appropriate dial-up modem protocols, including the aforementioned BELL, CCITT, ITU-T, and/or CCITT/ITU-T protocols. Further access may be provided to configuration server 114 via connection 115 to Internet 113. Configuration server 114 hosts a registration web page available via connection 115 to users of Internet 113. In addition, configuration server 114 includes multiple databases, including, for example, configuration database 120, registration database 121, and customer database 122. Configuration database 120 includes information for a particular automatic appliance to gain access to a packet switching network such as the Internet including, for example, ISP identity (e.g., IP address) account information of the user, (e.g., name, e-mail address, account number, etc.). Configuration database 120 may also include technical information about automatic appliance 101 based on serial number. Configuration database 120 may also include ISP-required parameters for Internet usage accessible by ISP name so that a user may merely identify their ISP rather than supply specific configuration details. Thus, technical information to configure, update, and maintain automatic appliance 101 may be keyed to serial number information within configuration database 120. Registration database 121 stores user- or registrant-provided information typically requested by a manufacturer from a consumer. The registration information may include, for example, purchaser name, address, e-mail address, telephone number, make, model and serial number of device purchased, etc. This information may then be used to update customer information stored in customer database 122.

[0019] In addition to providing access to a web server function of configuration server 114 by PC 107, Internet 113 further provides connectivity to a host of resources in support of automatic appliance 101. For example, connec-

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tivity may be provided to web server **123** providing access to software update database **124** used to download software to automatic appliance **101**. Web server **125** represents other facilities including music recognition services providing access to music information database **126**. This data may be used by automatic appliance **101** to supplement entertainment media resident on or downloaded to the appliance. For example, artist information contained in music information database **126** may be automatically downloaded to automatic appliance **101** in response to ripping of a Compact Disk (CD) to an MP3 file. Thus, the artist information may be downloaded and associated with the MP3 file at the time of conversion from the CD Pulse Code Modulation (PCM) format to the MP3 format.

[0020] PC **107** may be used by a person wishing to configure automatic appliance **101** (i.e., a registrant) to provide information. The configuration process may be enabled by accessing the web server portion of configuration server **114** via Internet **113** using an appropriate browser software to retrieve registration web page **108**. Referring to **FIG. 2**, registration web page **108** includes input form **201** having input areas **202**, **203**, and **204** for the entry of appropriate configuration information. This configuration information may include, for example, information required to identify automatic appliance **101** sufficiently to enable subsequent communications with the appliance such as, for example, a serial number. Other configuration information may include identification of the ISP to be used by automatic appliance **101** in establishing connectivity to the Internet such as the IP address of the ISP. Still other configuration information may include account information of the user or registrant as previously described. Upon entering the configuration information into the web browser and selecting the appropriate submit button, the configuration information may be transmitted to web server portion of configuration server **114** to be made available to automatic appliance **101**.

[0021] Referring again to **FIG. 1**, automatic appliance **101** may be placed in an initialization mode causing it to enable an internal dial-up modem. Automatic appliance **101** dials out to a pre-stored or a user-designated "1(800)" telephone number provided by an operator of configuration server **114** to provide access via telephone line or trunks **118** or interface **119** to the configuration server. Upon establishing communications with configuration server **114** over telephone lines **118** or **119**, automatic appliance **101** provides its serial number to configuration server **114**. In response, configuration server **114** accesses the appropriate configuration information stored in configuration database **120** and provides this information via its direct-dial interface to automatic appliance **101**. Automatic appliance **101** stores and acknowledges successful receipt of the configuration information to configuration server **114**, which then erases the information from configuration database **120** to avoid potential information privacy issues caused by retention of such information. Automatic appliance **101** uses the configuration information to configure the appropriate software, including web browser settings, modem parameters, etc. to provide access to the registrant's designated ISP **112** and the resources of Internet **113**. As previously mentioned, these Internet resources may include access to music recognition service web server **125** and music recognition database **126**, web radio sites (not shown), music downloads and other databases, services, etc. In addition, Internet **113** may provide peer-to-peer transfer of information files between simi-

lar automatic appliances **101**. For example, the web server portion of configuration server **114**, or another dedicated web server such as web server **123**, may be used to periodically update software resident in automatic appliance **101**.

[0022] A method of configuring an automatic appliance may be depicted in the flowchart of **FIG. 3**. The method avoids direct entry of substantial amounts of configuration information into the automatic appliance that typically has only limited capabilities for the input of such information. Instead, the method enables use of a user friendly input device such as a PC for the entry of configuration information, accessing of the Internet, and uploading of the configuration information to a remote server. The automatic appliance operating in an initialization mode subsequently accesses the remote server using, for example, a preprogrammed 800-telephone number and downloads the configuration information. Using the remote server as an intermediary enables use of typical PC input devices (e.g., keyboard, pointing device, etc.) to input the configuration information without requiring a direct interface to the automatic appliance. The method may be particularly applicable where a substantial amount of information must be provided by the user, the entry of which would otherwise require manual input of the information directly into the automatic appliance.

[0023] Starting at step **301**, a user or registrant logs into the Internet at step **302** and, at step **303** accesses a device configuration server. In response, the device configuration server provides a web page including an input form for the user to use to submit appropriate configuration information to accomplish the registration. In cases where the registrant may be using a PC sharing a telephone line with the automatic appliance, an appropriate message may be generated after the registrant has completed the form at step **305** instructing the registrant to log-off the Internet if required to provide telephone access to the automatic appliance.

[0024] At step **306** the automatic appliance may be activated in an appropriate initialization mode by the user/registrant and, at step **307** automatically dials out to the configuration server using a dial-up telephone line of a switched telephone network such as the PSTN. Dialing may be performed using standard telephone signaling protocols to provide dialing information, e.g., Dual-Tone-Multi-Frequency (DTMF), pulse dialing, ISDN out-of-band signaling, etc. At step **308** direct communications may be established with the configuration server and, at step **309**, the configuration information previously uploaded by the registrant may be downloaded to the automatic appliance. Upon confirmation that the download was successful at step **310**, the automatic appliance disconnects from the configuration server at **311** and the configuration server erases the local store of configuration information specific to the registrant. Step **313** may be included to transmit user product registration to a customer database maintained by the manufacturer of the automatic appliance. At step **314** the automatic appliance uses the configuration information to automatically configure itself, e.g., enable any required interfaces, establish access parameters, passwords, account numbers, etc. A connection may be established to a packet switching network such as the Internet by the automatic appliance at step **315** using the downloaded configuration information received from the configuration server. At step **316** an

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indication may be displayed that the Internet connection has been successfully made, the process terminating at step 317.

[0025] The invention as herein described enables a user of a device to provide configuration information using a separate or remote terminal such as a PC or a Personal Digital Assistant (PDA) in combination with a configuration server according to an embodiment of the invention. The invention may be further usable to provide other information and data that might be difficult to input using the limited facilities available on the automatic appliance, e.g., via a limited remote control device. For example, manually-input play list information may be entered using a PC, uploaded to an appropriate server where it may be stored for a later download to the automatic appliance.

[0026] While a programmable DEC has been used for purposes of illustration in connection with description of an automatic appliance compatible with an embodiment of the invention described, the invention may be equally applicable to other forms of appliances, including, for example, Internet appliances and even household appliances having micro-processors requiring Internet access, digital cameras, video cameras, Global Positioning System (GPS) receivers, and PDAs. All these appliances typically have limited or no integral means for the entry of configuration data required to provide such Internet access. Accordingly, such appliances may likewise incorporate an initialization mode of operation to automatically dial out to, for example, an 800-number to obtain dial-up access to a configuration server on which the user has previously stored appropriate configuration data. This configuration data may then be downloaded to the appliance over a direct dial-up interface to the configuration server, stored in memory of the device and used to then establish access to an appropriate ISP and the Internet.

What is claimed is:

1. A configuration server comprising:
 - a web server connected to an Internet and hosting a registration webpage accessible to a registrant on said Internet, said registration webpage including an input area receiving configuration information from said registrant;
 - a configuration database connected to said web server for storing said configuration information; and
 - a direct-dial interface connected to a telephone line and to said configuration database, said direct-dial interface operational to answer an incoming telephone call from an automatic appliance and, in response, transmit said configuration information to said automatic appliance.
2. The configuration server according to claim 1 wherein said configuration database automatically erases said configuration information in response to a successful transmission of said configuration information to said remote device on said telephone line.
3. The configuration server according to claim 1 wherein said configuration information includes information required by said remote device to access said Internet.
4. The configuration server according to claim 1 wherein said configuration information includes ISP and user account information.
5. The configuration server according to claim 1 wherein said input area comprises an input form including areas

designated for allowing a user to input information required for said remote device to gain access and connect to said Internet.

6. The configuration server according to claim 1 further comprising a registration database, said registration page further including an input area for receiving registration information from said registrant, said registration information including a name and an address of said registrant.

7. The configuration server according to claim 1 wherein said direct-dial interface includes a modem compliant with modulation, data transfer, and data compression protocols standards set by an organization selected from a group consisting of Bell, CCITT, ITU-T and CCITT/ITU-T.

8. The configuration server according to claim 1 wherein said web server is configured to authenticate portions of said configuration information corresponding to identification information of said remote device, said identification information including a serial number.

9. An automatic appliance configuration registration system comprising:

- (a) an automatic appliance including a memory for storing configuration information for automatically configuring said automatic appliance; and
- (b) a remote configuration server interface operational to answer an incoming call from said automatic appliance and, in response, transmit said configuration information to said automatic appliance, said remote configuration server comprising
 - (i) a web server connected to an Internet and hosting a registration webpage accessible to a registrant on said Internet, said registration webpage including an input area receiving said configuration information from said registrant; and
 - (ii) a configuration database connected to said web server for storing said configuration information.

10. The automatic appliance configuration registration system according to claim 9, said remote configuration server further comprising (iii) a communication interface connected to a telephone line and to said configuration database for answering said incoming call from said automatic appliance.

11. The automatic appliance configuration registration system according to claim 9, said automatic appliance further including a modem operable in (1) an initialization mode for establishing communications with said remote configuration server and (2) an operational mode for establishing communications with an internet service provider.

12. The automatic appliance configuration registration system according to claim 9 wherein said communications interface comprises a dial-up modem connected to a telephone line.

13. The automatic appliance configuration registration system according to claim 9 wherein said automatic appliance further comprises a device selected from the group comprising a programmable digital entertainment center, digital camera, video camera, global positioning system receiver, personal digital assistant, Internet appliance and a household appliance.

14. The automatic appliance configuration registration system according to claim 9 wherein said automatic appliance further comprises an interface to a television monitor and an integral alphanumeric display.

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15. The automatic appliance configuration registration system according to claim 9 wherein said automatic appliance further comprises (i) a compact disc (CD) player configured to play audio encoded using a pulse code modulation (PCM) technique and (ii) a digital music decoder configured to play audio encoded using a perceptual coding technique.

16. The automatic appliance configuration registration system according to claim 9 further comprising a computer comprising a web browser configured to access said registration webpage on said Internet.

17. An automatic appliance comprising:

- a first communication interface configured to establish data communications with a remote server on a first communications network to receive configuration information;
- a memory configured to receive and store said configuration information; and
- a second communication interface made operational in response to said configuration information for providing access to a second communications network.

18. The automatic appliance according to claim 17 wherein said first communication interface comprises a telephone line modem.

19. The automatic appliance according to claim 18 wherein said first communication network comprises a switched telephone network and said telephone line modem includes a dialer configured to provide dialing information to said switched telephone network.

20. The automatic appliance according to claim 17 wherein said second communications interface comprises a client connected to a packet switching network.

21. The automatic appliance according to claim 20 wherein said packet switching network comprises the Internet and said configuration information includes internet service provider access information.

22. The automatic appliance according to claim 17 further comprising an interface to a television monitor and an integral alphanumeric display.

23. The automatic appliance according to claim 17 further comprising (i) a compact disc (CD) player configured to play audio encoded using a pulse code modulation (PCM) technique and (ii) a digital music decoder configured to play audio encoded using a perceptual coding technique.

24. A method of configuring an automatic appliance comprising the steps of:

- receiving configuration information from a client;
- storing said configuration information in a memory;
- accessing said memory with said automatic appliance operating in an initialization mode;
- downloading said configuration information from said memory to said automatic appliance operating in said initialization mode;
- automatically configuring a communications interface of said automatic appliance with said configuration information; and
- connecting to a remote server with said communications interface.

25. The method of configuring an automatic appliance according to claim 24 further comprising transmitting a registration webpage to said client.

26. The method of configuring an automatic appliance according to claim 24 wherein said step of access said memory includes connecting to a dial-up telephone line and dialing a telephone number of a configuration server.

27. The method of configuring an automatic appliance according to claim 24 further comprising a step of automatically erasing said configuration information from said memory.

28. The method of configuring an automatic appliance according to claim 24 further comprising the steps of receiving user registration information from said client and transmitting said user registration information to a user registration database.

29. The method of configuring an automatic appliance according to claim 24 where in said step of receiving configuration information from said client comprises receiving automatic appliance identification information and Internet access information including a user account number.

30. The method of configuring an automatic appliance according to claim 24 wherein said step of connecting to said remote server with said communications interface comprises accessing a music recognition service and downloading information about music stored by said automatic appliance.

31. The method of configuring an automatic appliance according to claim 24 further comprising the step of inputting said configuration information to said client using a personal computer.

32. The method of configuring an automatic appliance according to claim 24 wherein said step of receiving includes a step of accessing an Internet site using a personal computer.

* * * * *

US006882712B1

(12) **United States Patent**
Iggulden et al.

(10) **Patent No.:** **US 6,882,712 B1**
(45) **Date of Patent:** ***Apr. 19, 2005**

(54) **METHOD AND APPARATUS FOR SETTING
PROGRAMMABLE FEATURES OF AN
APPLIANCE**

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(75) Inventors: **Jerry Iggulden**, Santa Monica, CA
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(US)

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(US)

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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Primary Examiner—Stella Woo

(74) Attorney, Agent, or Firm—Blakely Sokoloff Taylor & Zafman, LLP

(21) Appl. No.: **10/155,531**

(22) Filed: **May 24, 2002**

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(63) Continuation-in-part of application No. 09/415,299, filed on Oct. 8, 1999, now Pat. No. 6,483,906, which is a continuation-in-part of application No. 09/351,270, filed on Jul. 12, 1999, now Pat. No. 6,256,378, which is a continuation-in-part of application No. 09/235,709, filed on Jan. 22, 1999, now Pat. No. 6,415,023.

(51) Int. Cl.⁷ **H04M 11/00**

(52) U.S. Cl. **379/102.03**; 379/102.01;
379/93.17; 379/90.01

(58) Field of Search 379/102.03, 102.01,
379/102.02, 110.01, 90.01, 93.17, 93.25;
345/329, 970, 339, 336; 709/220, 221,
222, 217, 218; 359/163, 142

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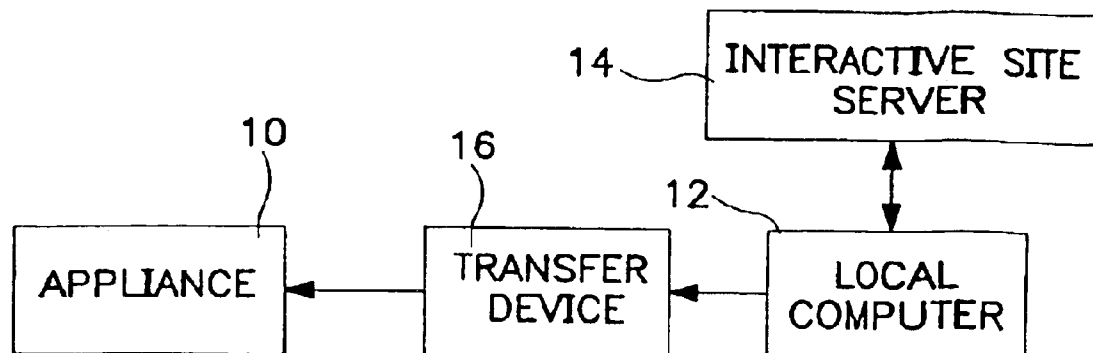
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(57) **ABSTRACT**

An interactive interface facilitates the setting of preferences and other programmable parameters of an appliance. The interface is hosted by a server on a global computer network. The appliance owner initiates a connection to the server and is presented with a graphical user interface for setting the preferences and features of the appliance. Once the desired settings have been made, they are downloaded to the appliance either directly from the server or the appliance owner's computer or indirectly using a portable transfer device.

60 Claims, 7 Drawing Sheets



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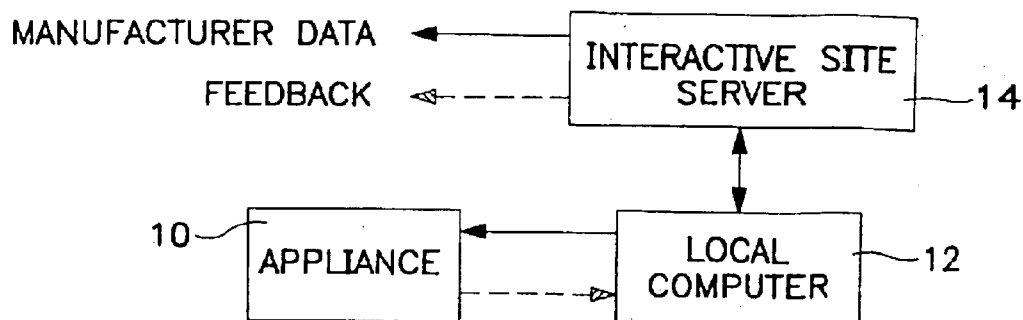


FIG. 1

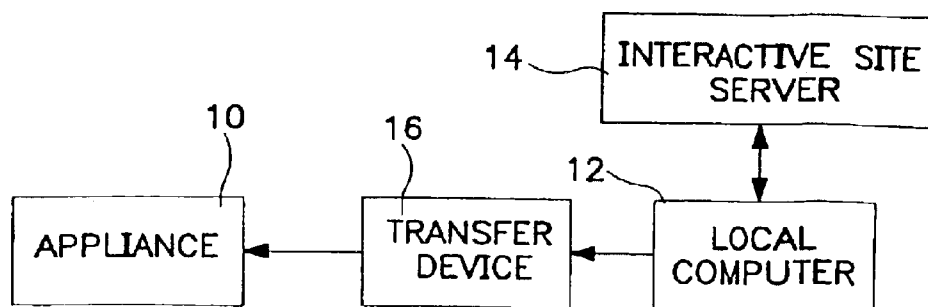


FIG. 2

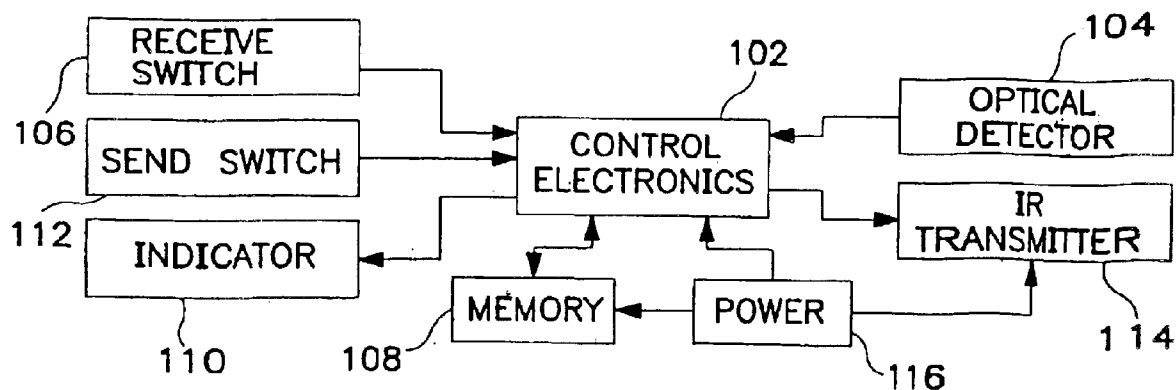


FIG. 3

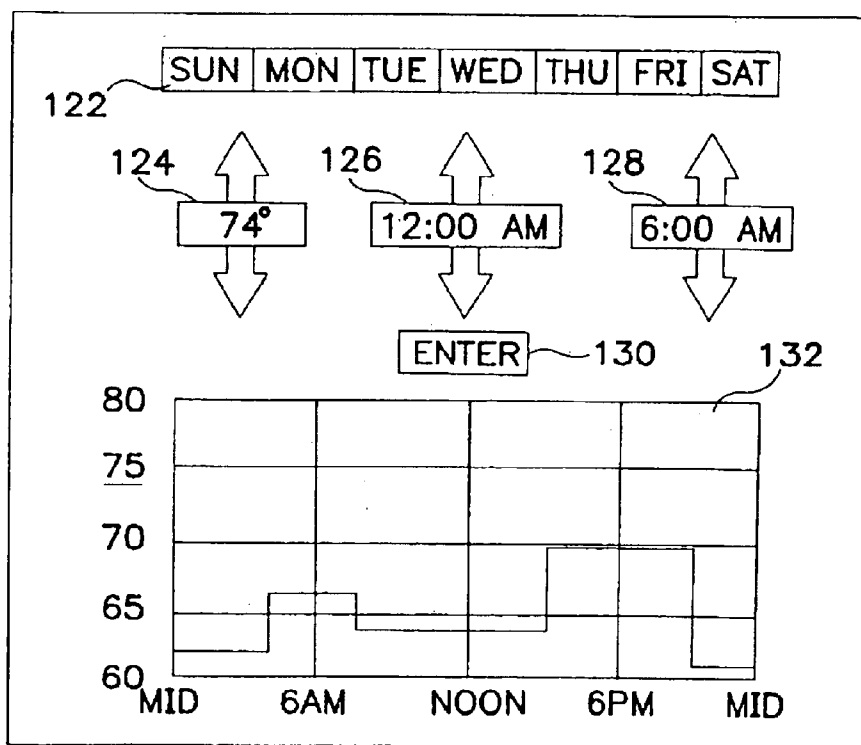


FIG. 4

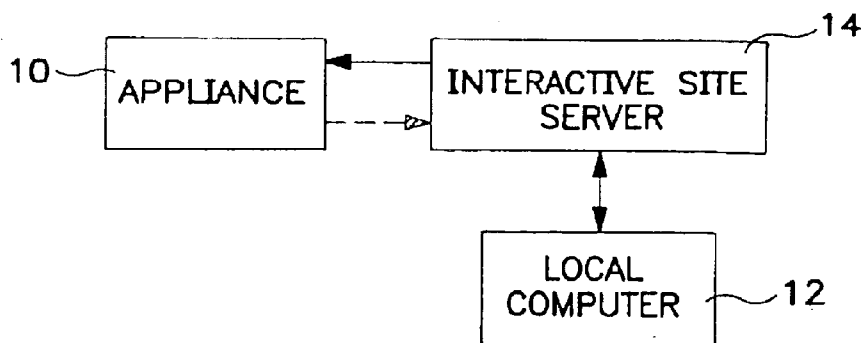


FIG. 5

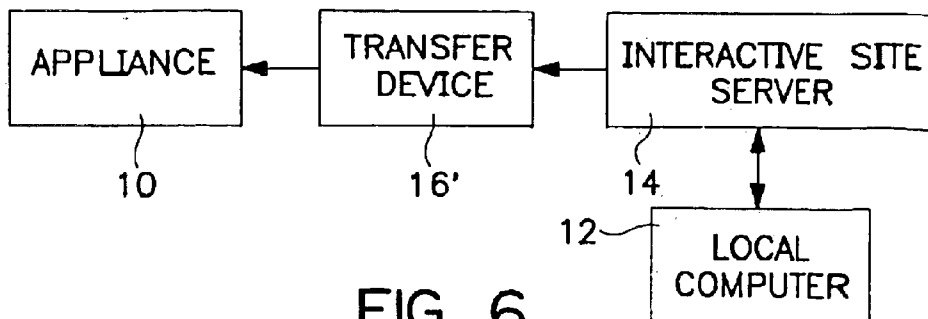
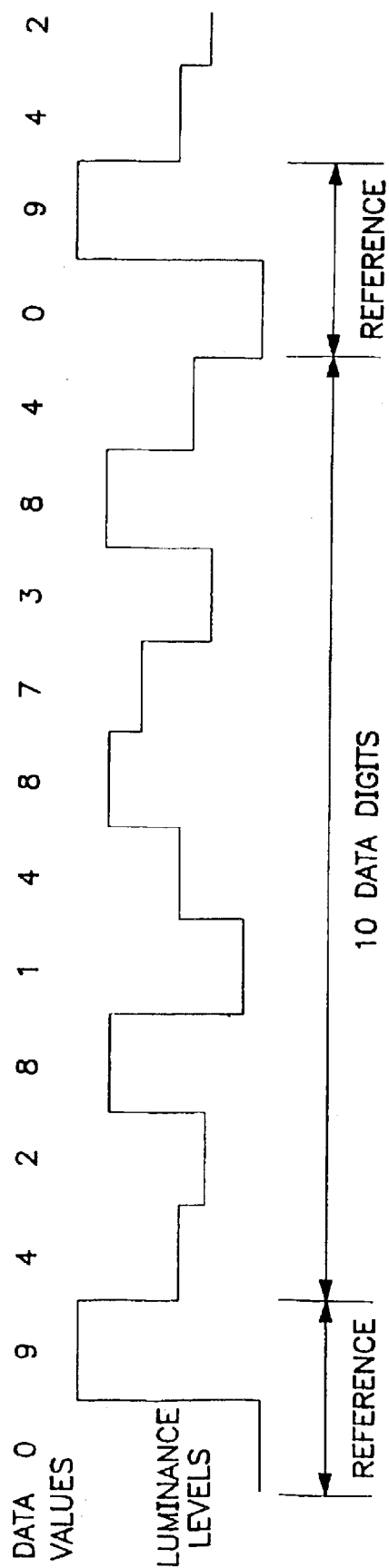


FIG. 6



LUMINANCE MODULATION

FIG. 7

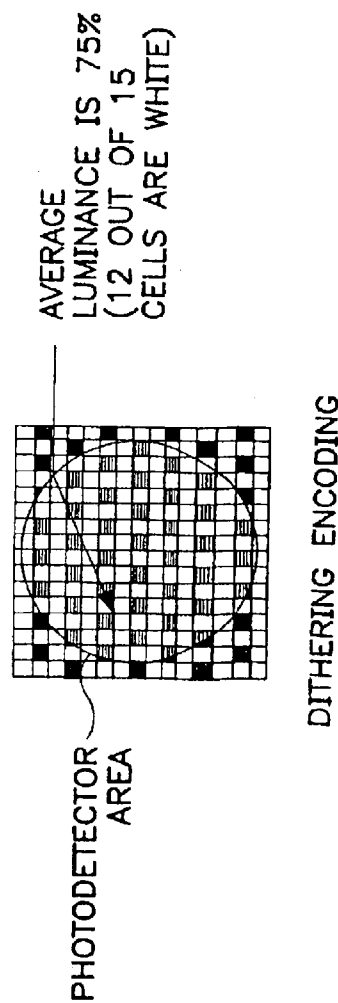


FIG. 8

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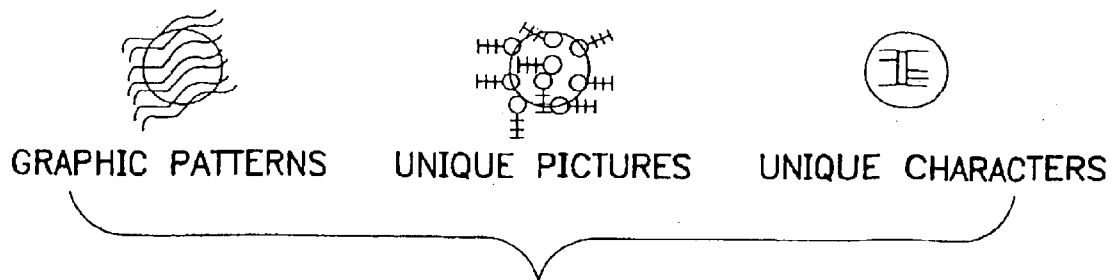


FIG. 9

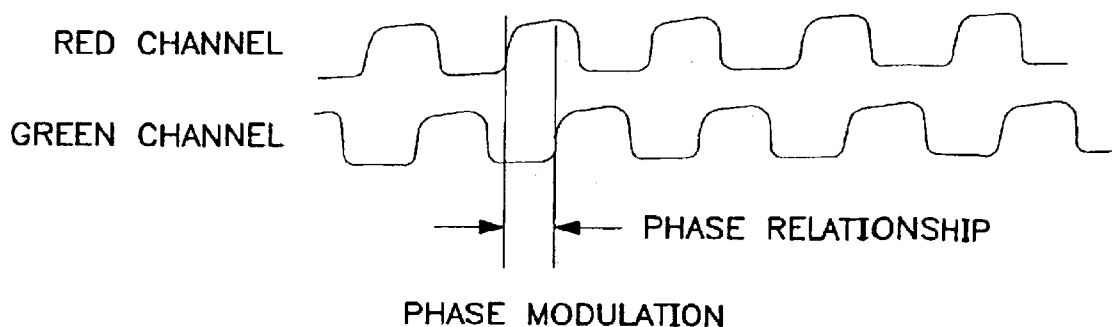


FIG. 10

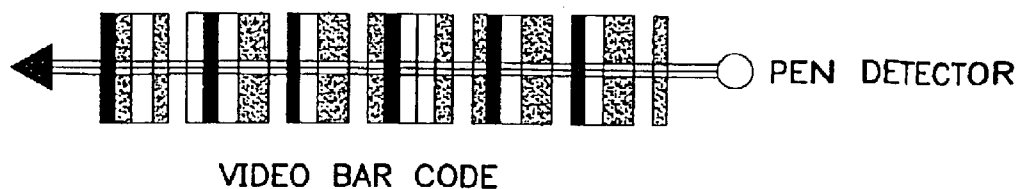


FIG. 11

ORIGINAL DATA	3	5	5	8	0	9	4	4	4	2	3	4	
ENCODED DATA	3	5	>	8	0	9	4	>	4	2	3	4	*

↑
REPEAT

↑
REPEAT

SELF CLOCKING DATA ENCODING

FIG. 12

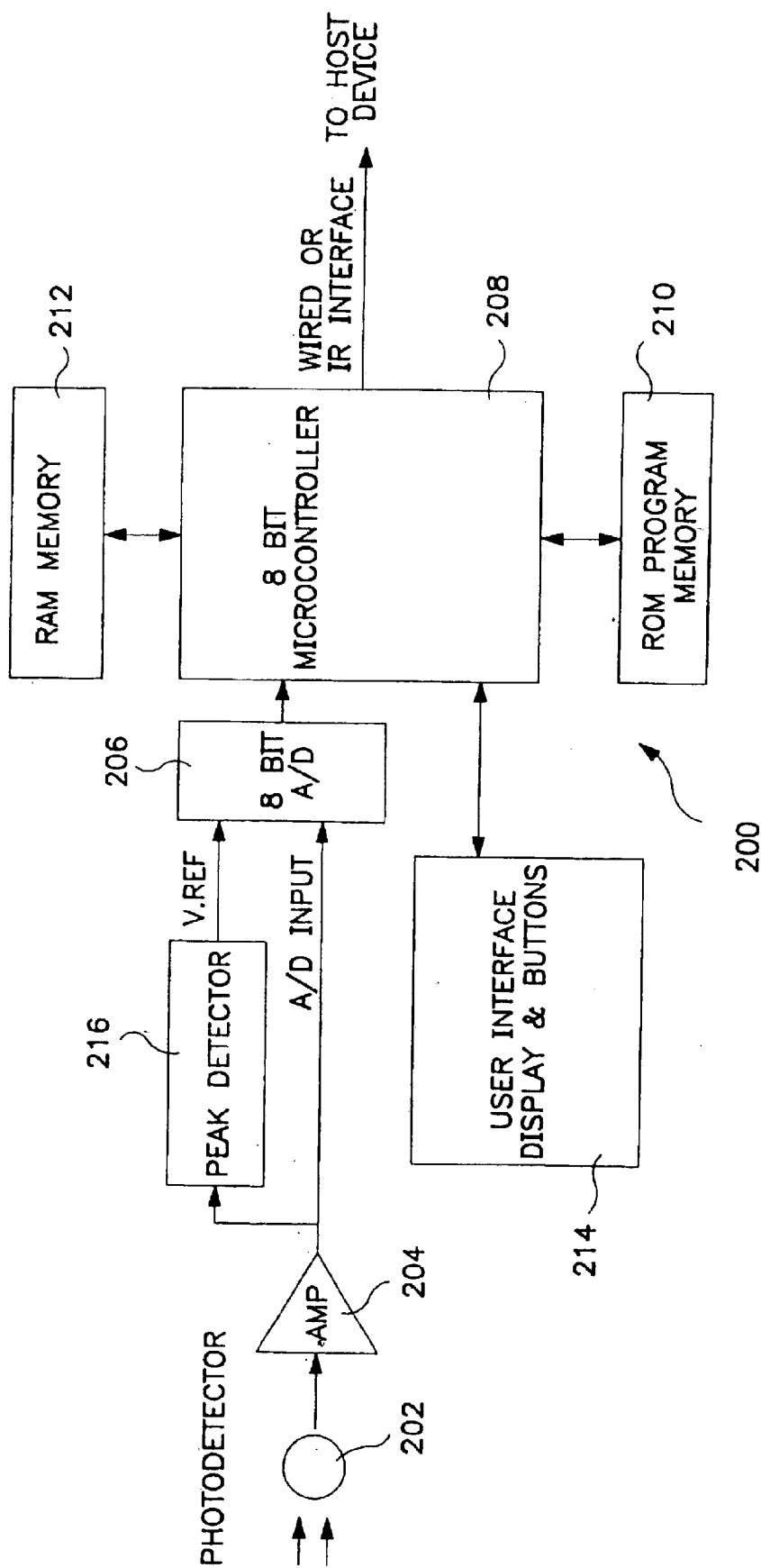


FIG. 13

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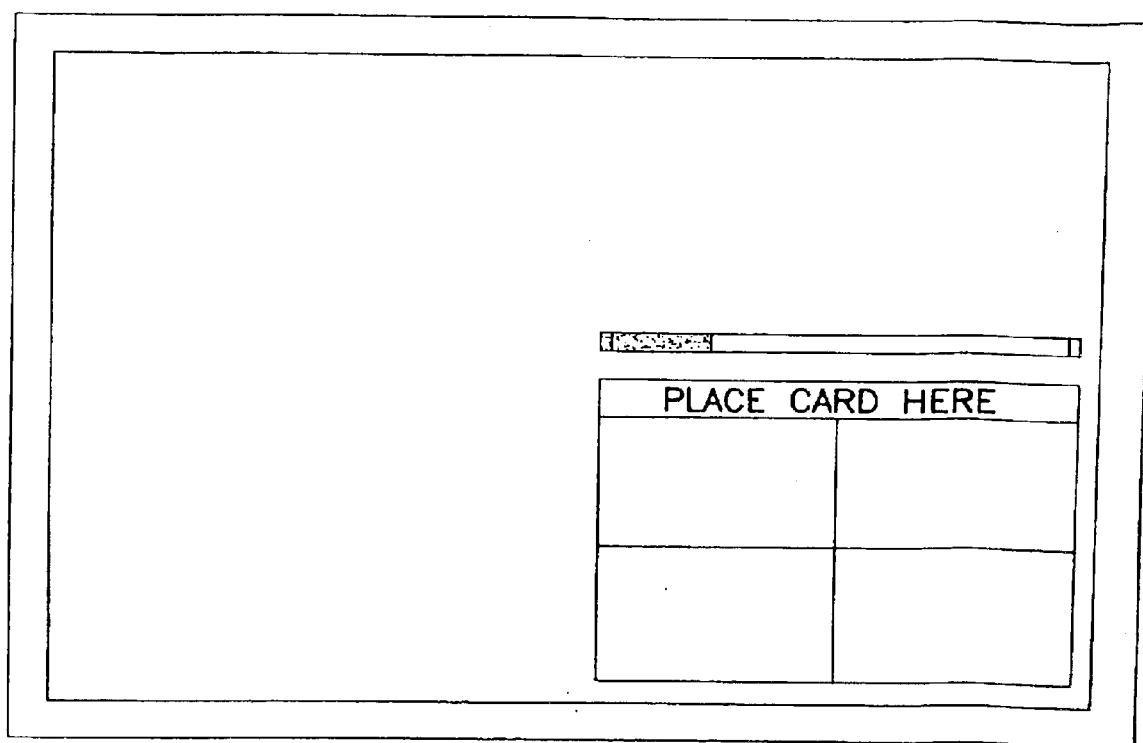


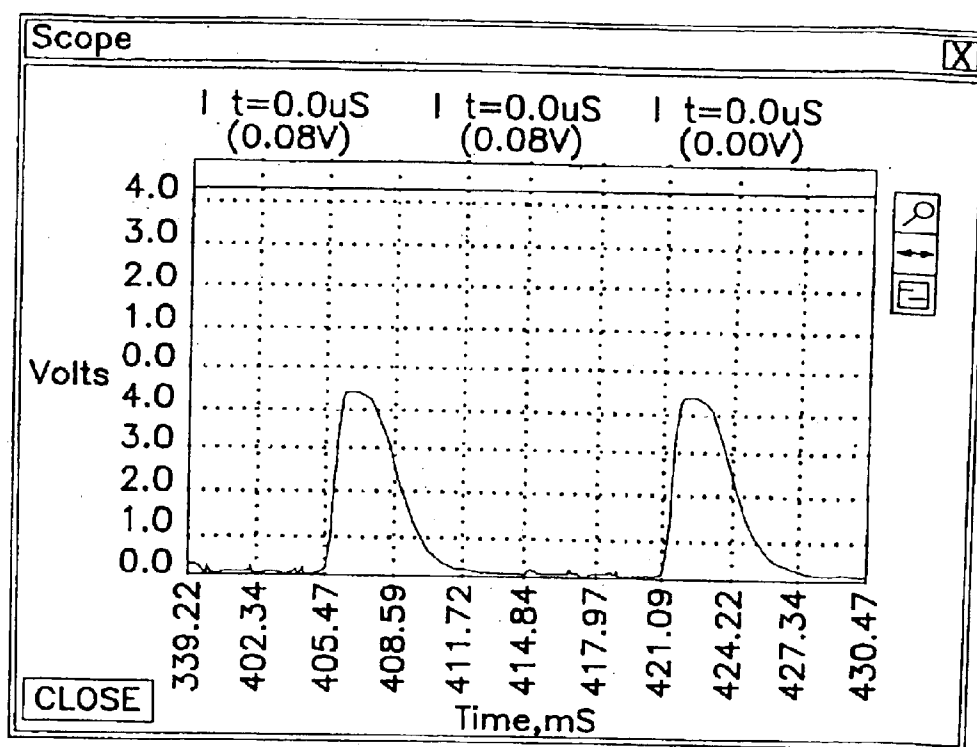
FIG. 14

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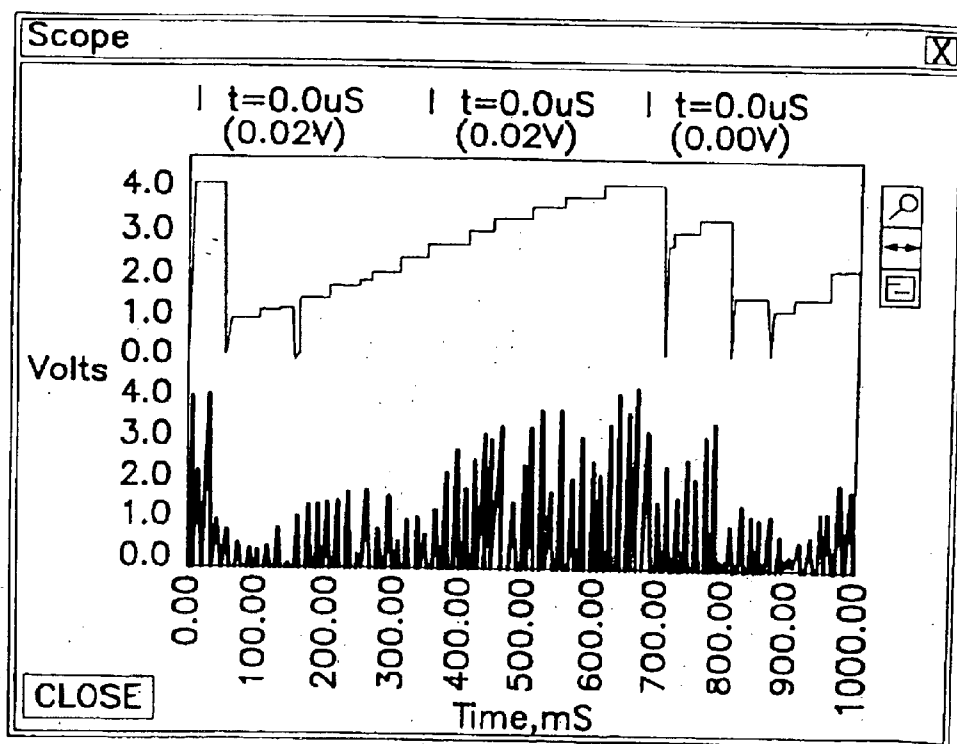
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CRT photoresponse

FIG. 15



calibration sequence

FIG. 16

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METHOD AND APPARATUS FOR SETTING PROGRAMMABLE FEATURES OF AN APPLIANCE

RELATED APPLICATION

This is a continuation-in-part of application Ser. No. 09/415,299, filed Oct. 8, 1999 now U.S. Pat. No. 6,483,906, which is a continuation-in-part of application Ser. No. 09/351,270, filed Jul. 12, 1999, now U.S. Pat. No. 6,256,378, which is a continuation-in-part of application Ser. No. 09/235,709, filed Jan. 22, 1999 now U.S. Pat. No. 6,415,023.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the field of setting programmable features of an appliance. More particularly, the invention provides a method and apparatus for conveniently setting various programmable features of an appliance using a graphical user interface accessed with a computer via a global computer network.

2. Prior Art

The advent of microprocessors and other miniaturized electronics has facilitated the implementation of increasingly complex functions in home and office appliances. Typically, a relatively complex operator interface is required in order to invoke the various functions that are available. For example, home electronic devices such as televisions, VCRs, stereo receivers and the like are typically provided with sophisticated remote control devices. Such remote control devices have a large number of individual buttons that are used to directly control features of an appliance and/or that are used to navigate through on-screen menus. Because of the sophistication and complexity of the controls, owner's manuals for appliances are becoming increasingly voluminous and difficult to comprehend.

Due to the growing complexity of modern appliances, many of the available features are never utilized by consumers, even as competition in the marketplace drives the proliferation of such features. A number of solutions have been proposed for making appliances easier to control and generally more "user friendly". For example, U.S. Pat. No. 5,553,123 issued to Chan, et al. discloses a method for downloading set-up data via a telephone to an appliance controller. A user first initiates a telephone call to a remote site having a computer. The user communicates certain background information to the remote site, and set-up data is then downloaded via the telephone connection. The earpiece of the telephone is held in proximity to a microphone built into the appliance controller in order to receive the downloaded data. Upon receipt of the data, the controller is configured to operate the appliance.

U.S. Pat. No. 5,600,711 issued to Yuen discloses an apparatus and methods for providing initializing settings to an appliance. When a user wishes to initialize the settings of an appliance, the user initiates a telephone connection with a remote site. The remote site then downloads a sequence of commands for initializing the settings in the appliance over the telephone connection. A remote control device for the appliance receives the sequence of commands and stores them in an internal memory. The remote control device is then aimed at the appliance and the user enters a command to transfer the stored sequence of commands to the appliance, thereby initializing the settings.

U.S. Pat. No. 5,141,756 issued to Levine discloses a method of initializing a programmable control device, such

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as a remote controller for a video cassette recorder. The device is programmed by connecting it to a telephone system, dialing a remote initializing center preferably employing a computer, and providing the computer with information as to the environment of the control device by using touch tone keys to respond to audio inquiries transmitted by the computer. The computer then transmits the initializing program for loading into the memory of the control device.

U.S. Pat. No. 5,774,063 issued to Barry, et al. discloses a method and apparatus for remote control of electronic devices from a computer. A transducer, such as an infrared transmitter, is coupled to a computer and aimed at an electronic device to be controlled. An application program running on the computer generates appropriate signals for control of the electronic device.

U.S. Pat. No. 5,815,086 issued to Ivie, et al. discloses a method and apparatus for communicating commands to electrical appliances from remote locations. Various appliances within a structure, such as a house, are coupled to a signal-conducting bus, such as the AC power wiring bus of the structure. Appliance commands are issued over the bus from a central transmitter. Appliances may be directly coupled to the bus or may receive commands via an infrared signal from an infrared transmitting device coupled to the bus. A handheld control device may be supplied for controlling the various appliances, in which case, receivers for the handheld control device are coupled to the bus in various parts of the structure.

U.S. Pat. No. 5,819,294 issued to Chambers discloses a programmable universal remote controller. A programming device is coupled to a computer and receives signals from conventional remote controllers. The programming device correlates the received signals with a database of stored signals used by various appliance manufacturers. The programming device then sends a complete set of appropriate control signals to the programmable universal controller.

U.S. Pat. No. 5,228,077 issued to Darbee discloses a universal remote controller that may be programmed from a remote location. The remote controller receives programming data via a video or telephonic data transmission system.

U.S. Pat. No. 5,488,571 issued to Jacobs, et al. discloses a system for transferring data from a video display monitor of a personal computer to a portable information device such as an appointment scheduling device. The video display is modulated to transmit data to an opto-electronic receiver in the portable information device.

Microsoft Corporation has introduced a cordless phone having programmable functions controlled by a personal computer. The base station of the phone is coupled to the serial port of a computer and application software is installed on the computer to control operation of the phone.

SUMMARY OF THE INVENTION

The present invention provides methods and apparatus for setting preferences and other parameters of an appliance. In preferred embodiments of the invention, a user initiates a connection to an interactive site on a global computer network. The site hosts a graphical user interface with which preferences and other parameters of an appliance may be set by the user. In some embodiments, set-up data for the appliance may be downloaded directly to the appliance from the user's computer or the interactive site. In other embodiments, set-up data for the appliance is downloaded from the user's computer or the interactive site to a transfer

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device where it is temporarily stored. The transfer device is then used to program the appliance. Since the appliance itself does not require a user interface for set-up procedures and programming, the appliance can be smaller, cheaper and lighter without sacrificing any functionality. In addition, the need for a printed user's manual is largely obviated since all of the information normally contained in such a manual can be obtained from the interactive site.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a functional block diagram of a first embodiment of the invention wherein an appliance receives data directly from a local computer.

FIG. 2 is a functional block diagram of a second embodiment of the invention wherein an appliance receives data from a local computer via a transfer device.

FIG. 3 is a functional block diagram of a transfer device as shown in FIG. 2.

FIG. 4 illustrates a graphical user interface suitable for setting programmable features of a thermostat.

FIG. 5 is a functional block diagram of a third embodiment of the invention wherein an appliance receives data directly from an interactive site server.

FIG. 6 is a functional block diagram of a fourth embodiment of the invention wherein an appliance receives data from an interactive site server via a transfer device.

FIG. 7 illustrates luminance modulation for transferring decimal data digits.

FIG. 8 illustrates luminance modulation with dithering encoding.

FIG. 9 illustrates luminance modulation with irregular graphic patterns.

FIG. 10 illustrates bi-color phase modulation.

FIG. 11 illustrates video bar code modulation.

FIG. 12 illustrates a self-clocking data encoding scheme for use with the present invention.

FIG. 13 is a functional block diagram of a receiving device suitable for use with the present invention.

FIG. 14 illustrates a display screen having a portion thereof for data transfer.

FIG. 15 is a plot of CRT photoresponse of a prototype system constructed in accordance with the present invention.

FIG. 16 is a plot of a calibration sequence used in the prototype system.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, for purposes of explanation and not limitation, specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that the present invention may be practiced in other embodiments that depart from these specific details. In other instances, detailed descriptions of well-known methods and devices are omitted so as to not obscure the description of the present invention with unnecessary detail.

The present invention finds application with a wide variety of home and office appliances. Some categories of appliances in which the invention may be utilized include clocks, telephones, televisions, television set-top decoders, video recorders, audio and video entertainment system components, refrigerators, conventional ovens, microwave ovens, dishwashers, irrigation systems, global positioning

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satellite (GPS) receivers, automobile heating, ventilating and air conditioning (HVAC) systems, automobile sound systems, home security systems, home HVAC systems, home master control systems, facsimile machines, copiers, cameras, postage meters, etc. "Programmable features" refer to any appliance features that may be altered. These include, for example, initialization or set-up parameters, stored data (e.g., telephone speed dial numbers or GPS receiver database) and the operating system or other internal software. Specific examples are given below to illustrate operation of the invention. However, it will be understood that the invention has general applicability to appliances of all types and to all types of programmable features within such appliances.

"Appliances" will be understood to include any device or system that has programmable features, including those that not normally thought of as "appliances." For example, an automobile has numerous on-board systems that are programmable in one way or another. Thus, the automobile itself may be viewed as an "appliance," as may the individual systems. In a similar vein, a residential dwelling contains a number of individual appliances. The dwelling, together with the individual appliances, may be viewed collectively as a single "appliance." This is particularly true if the individual appliances are connected to a home network. In this case, a single user interface may be provided to program the various systems and appliances of the dwelling. These may be communicated directly to a central controller on the home network or through a transfer device. A transfer device may be advantageously combined with a key to open the dwelling so that appliance features are programmed upon entering the dwelling. This is especially useful when there are multiple occupants in the dwelling. Each key may then carry the individual preferences of the respective occupant. Conflicts in preferences may be resolved through a priority hierarchy established when the preferences are programmed with the user interface. Of course, the invention is not limited to residential dwellings and may be employed as well with offices, stores and other habitable spaces.

The invention also has applicability apart from setting programmable features of appliances. For example, the invention may be employed to purchase pay-per-view programming at an interactive web site. An authorization code may then be downloaded into the transfer device of the invention and transferred to a TV set-top box so that the purchased program will be "descrambled". This approach eliminates the telephone connection required for most TV set-top boxes with pay-per-view capability.

Another potential application for the invention is as a programmable "token". For example, a consumer product manufacturer may offer discounts on certain of its products at its web site. Authorization to receive the discount may be downloaded into the transfer device of the invention and the transfer device may then be taken to a retailer. The transfer device is then used to transmit the discount authorization to a receiving terminal at the retailer. Ideally, the terminal would also have the ability to modify the stored contents of the transfer device so that the discount authorization could be cancelled once the discount is given. This same "token" approach can also be applied to pre-paid purchase transactions; reservations at restaurants, hotels, parks, etc.; entry authorization to entertainment venues or other secured areas and similar situations in which a conveniently transported authorizing token serves as an extended communication link from a computer system.

A first embodiment of the invention is illustrated in FIG. 1. An appliance 10 receives set-up data from a local com-

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puter 12. In a typical application, local computer 12 is a general purpose personal computer of the type now widely found in homes and offices. Details of computer 12 are not particularly relevant to the invention and are not shown. Typically, computer 12 will comprise, at a minimum, a processing unit, a keyboard and a display. Additional input devices, such as a mouse or other pointing device, and output devices, such as a printer, may also be included as part of computer 12.

Local computer 12 is coupled to a remote interactive site server 14 by a telecommunications link. In a typical embodiment of the invention, interactive site server 14 would be accessible via the World Wide Web. Other appropriate means for connecting computer 12 to server 14 could also be employed. Server 14 contains programming for interactively setting the programmable features of appliance 10. Preferably, server 14 presents to the owner of appliance 10, via computer 12, a graphical user interface that is tailored to appliance 10 and the programmable features thereof. Such interface can be thought of as a "virtual appliance". This can be better understood from the discussion of FIG. 4, below.

In the embodiment illustrated in FIG. 1, appliance 10 is coupled directly to local computer 12. This embodiment is best suited for portable appliances that may be conveniently carried to the computer for set-up. The coupling between appliance 10 and computer 12 may be one-way from the computer or two-way. One-way communication may be accomplished optically by providing appliance 10 with an optical sensor and modulating the display of computer 12 utilizing one or more of the techniques described below. Other communication techniques can be employed using audio, magnetic, inductive, infrared, or radio frequency coupling. Two-way communications are most conveniently established by connection to a serial port of computer 12. The serial port may be configured in accordance with any of the appropriate industry standards, such as, for example, Universal Serial Bus (USB), Fire Wire, etc. Naturally, this type of connection is not ideal for all appliances, but is particularly well-suited to portable appliances that may require a large amount of data. For example, loading data into a pocket organizer or similar type of personal digital assistant can be most conveniently accomplished with a serial port connection in the configuration illustrated in FIG. 1.

A two-way connection also allows "synchronization" of the real appliance with the virtual appliance. Even though most of the feature configuration of an appliance will be done using the virtual appliance interface, there may still be features and settings that can be controlled directly at the real appliance. By periodically reestablishing a two-way connection with the computer, the virtual appliance can be updated with any changes in the settings of the real appliance.

Another advantage of two-way communications is that it may be used to facilitate remote troubleshooting of appliances. Data from the appliance may be transmitted to computer 12, and from there to the appliance manufacturer or support facility via an Internet or email connection. Analysis of the data can then be used to issue appropriate repair orders. In some cases, repairs may be effectuated by downloading connective software or firmware in the same manner that appliance set-up is accomplished.

Some types of appliances can be readily adapted to utilize existing components for establishing communications with computer 12. For example, electronic cameras inherently possess optical sensors than can be used to sense modulation

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of a computer display screen or other light source. The primary imaging path of the camera may be used in the case of video cameras and digital still cameras. This simply requires the addition of circuitry and/or software to decode the modulation and store the appropriate set-up parameters. Alternatively, the receiver of the camera's focusing range finder may be used as the optical sensor.

In order to provide the appropriate interface for programming the features of appliance 10, server 14 preferably receives data from the appliance manufacturer. Such data may be received periodically as new model appliances are released by the manufacturer or may be obtained by server 14 in real time with a dial-up connection to the manufacturer. The latter approach offers the advantage of insuring that the most recent product information is available to server 14. One method of insuring that the appropriate information for appliance 10 is obtained by server 14 is to prompt the appliance owner to input the serial number of the appliance at computer 12. This need only be performed once, since the serial number can thereafter be stored in computer 12 and/or server 14 for use in subsequent programming of the same appliance. Warranty registration for the appliance may be conveniently performed during this same procedure.

An optional aspect of the invention is the ability of server 14 to provide valuable feedback to the appliance manufacturer. During appliance set-up operations, server 14 collects information concerning consumer's use of product features that can be useful in product marketing and new product design. The link between server 14 and the appliance manufacturer also facilitates new marketing opportunities. The manufacturer can readily target advertising to identified purchasers of its product. Also, the manufacturer can offer accessories and related products for appliance 10. Such offers may be integrated with the set-up interface or may be directed to the appliance owner separately by email or conventional mail. It should be appreciated that the invention can facilitate warranty registration. Since the appliance owner is already communicating with server 14 to set programmable features of the appliance, it is a simple matter to collect the additional information necessary to complete warranty registration and, if desired, to provide additional demographic data to the manufacturer.

FIG. 2 illustrates an alternative embodiment of the invention. This embodiment is similar to that of FIG. 1, except that programming data is provided to appliance 10 by a transfer device 16. This transfer device receives the programming data from local computer 12 by a wired connection to computer 12 or, by an opto-electronic or other wireless data link such as will be described more fully below. Furthermore, the transfer device may communicate with the appliance via a wired connection or via a wireless data link.

FIG. 3 is a functional block diagram of a suitable transfer device 16. At the heart of device 16 is a control electronics module 102. Data modulated on the display screen of computer 12 is sensed by optical detector 104 upon activation of receive switch 106. The data is demodulated by electronics 102 and is stored in memory 108. Upon confirmation of error-free transfer and storage of the data, a suitable indication is provided to the user by means of indicator 110, which may be, for example, a light emitting diode (LED). With the data loaded in memory 108, transfer device 16 may be carried to appliance 10, which may include a "docking" port for transfer device 16. Thus, transfer device 16 may be an integral component of appliance 10, which is provided to the consumer by the appliance

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manufacturer. Alternatively, transfer device **16** may be connected to an input port of appliance **10** with an electrical cable or "tether" which may have a fixed or removable connection to the transfer device and/or the appliance. In still other embodiments, appliance **10** may be provided with an infrared receiver coupled to its internal control electronics. In the case of an IR link, transfer device **16** is equipped with an appropriate infrared transmitter **114** and is held in proximity to the infrared receiver of appliance **10**. Upon actuation of transmit switch **112**, the data stored in memory **108** is appropriately modulated by electronics **102** and applied to infrared transmitter **114**. Indicator **110** may confirm to the user that the data has been transmitted. Alternatively, or in addition, an indicator may be provided on appliance **10** to signal receipt of the data. Power source **116**, preferably in the form of common alkaline battery cells, provides electrical power to the components of device **16**.

Transfer device **16** may be configured to transfer data from the appliance back to the computer as well. This facilitates synchronization of the virtual and real appliances as explained above. Data from the appliance may be loaded into the transfer device by means of an opto-electronic link in the same manner by which data is loaded from the computer. Preferably, however, the transfer device will have a direct electrical coupling to the appliance for applications involving two-way communications. Transfer of data into the computer may be accomplished in a number of ways. For example, transfer device **16** may couple directly to a serial or parallel input port of the computer as discussed previously, in which case a single physical port on the transfer device may serve as both input port and output port. Alternatively, transfer device **16** may include a sound transducer by which data may be transferred through a microphone coupled to the computer.

Transfer device **16** may be configured in various forms. Preferably, device **16** is easily portable. Device **16** may be in the form of a pen or wand with optical detector **104** and infrared transmitter **114** at one end. Transfer device **16** may also be integrated with a conventional remote controller for those types of appliances that are commonly controlled remotely. In another variation, transfer device **16** may be a removable module that is docked into appliance **10** as described above. In such case, communication between the transfer device and the appliance may be accomplished with a direct electrical connection through a suitable arrangement of electrical contacts. Transfer device **16** may, in fact, comprise the "brains" of appliance **10** in the form of a microprocessor or equivalent device. Aside from the ease of programming features and functions of the appliance, such an arrangement offers the added benefit of facilitating service or replacement of the appliance's electronic components in the event of malfunction.

The embodiment shown in FIGS. **2** and **3** is particularly well-suited to appliances that are relatively fixed in position and that require only limited amounts of data. Examples of such appliances abound in the home and office. One such example is a thermostat for a home HVAC system. FIG. **4** illustrates a graphical user interface for a thermostat as presented on a display of computer **12**. Such interface is shown merely for purposes of illustration, it being understood that the particular features of the interface are largely a matter of design choice.

Along the top of the display shown in FIG. **4** is a day strip **122**. The user may select any one of the days with a cursor to program the thermostat settings for that day. Below the day strip is a temperature selector **124**. Pointing at the up or down arrow with a mouse or other cursor positioning device,

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the user selects the desired temperature. To the right of temperature selector **124** there are a pair of time windows **126** and **128**. Using the appropriate up and down arrows, the user selects the starting and ending times for which the temperature selection applies. When the desired settings have been made, the user selects ENTER button **130** to store the selections and then proceeds to make the next set of selections. For convenience, the ending time last entered may be automatically inserted into the starting time window. A graphical display **132** of the selected temperature profile may be provided for the user's convenience.

When all settings have been completed, the data is loaded into transfer device **16**, which is then taken to the physical location of the thermostat for transfer of the data. Since all of the settings have been entered into the computer **12**, they may be conveniently saved locally and/or by server **14** for subsequent use in revising these settings or for reloading the settings in the event of a power failure. A printed record of the settings may also be made from computer **12**. For some appliances, a print-out following a set-up procedure may be used as a template for the appliance to indicate selected options and programmed features. For example, certain appliances may have unlabeled function buttons for which a template may be made once selected functions have been assigned to the buttons during a set-up procedure.

It will be appreciated that a thermostat physically incorporating the interface shown in FIG. **4** would be quite large and costly in comparison to conventional thermostats. This is due primarily to the relative complexity of the interface, since the actual componentry to provide such flexibility of thermostat settings is actually quite small and inexpensive. Through use of the present invention, virtually unlimited flexibility in thermostat programming may be accomplished with a thermostat that is no larger and no more costly than a conventional thermostat. Indeed, a thermostat as just described could easily be made the size of a postage stamp.

Another example of an "appliance" to which the present invention can be advantageously applied is the modern automobile. The driver interface for automobiles has become more and more complicated as more and more electronic and computer driven features have become available. Seat position and temperature, mirror position, audio entertainment settings, HVAC settings and navigational settings can all be set electronically. Many of the available settings are changed only infrequently, and thus may require reference to the owner's manual in order to change the settings manually. Naturally, different drivers have different preferences and this can result in a lengthy process of changing settings each time a different driver enters the vehicle. The present invention provides a convenient way to communicate driver preferences to the various electronic systems of an automobile. As explained above, a driver can set many of the desired preferences using an interactive program with a graphical user interface. A transfer device is then used to communicate the preferences to the automobile. In this particular example, the transfer device may also function as a key to enable operation of the automobile. Certain preferences, such as seat position and mirror position that are established in the automobile itself can be stored in the transfer device along with the preference data downloaded from the driver's home computer.

Use of the present invention facilitates customized driver controls. For example, touch screen display panels are now used in many automobiles. Using a graphical user interface, a driver can design a customized set of controls for operating features of interest to that driver. One driver may wish to have certain radio selections readily available, whereas

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another driver may wish to have available a selection of destinations for the navigation system. These preferences are communicated via the transfer device as described above. Controls that are customized in this manner are not limited to touch screen selections. By the same process, driver defined functions may be assigned to buttons, dials and other mechanical controls as well to create individualized “function keys.” Furthermore, it will be appreciated that creating customized controls in this manner is not limited to the context of automobiles, but may be applied to any type of appliance.

FIG. 5 illustrates another alternative embodiment of the invention. In this case, data for appliance 10 is received directly from server 14 rather than local computer 12. From the appliance owner’s perspective, the appliance programming interface is otherwise identical to the previously described embodiments. Communication between server 14 and appliance 10 may be telephonic. Appliance 10 may incorporate a conventional modem, in which case communications may be two-way, or may simply have a data demodulator for one-way communications. Coupling of appliance 10 to the telecommunications network may be by a conventional RJ-11 connection. Alternatively, appliance 10 may incorporate a cordless telephone module for communicating with a separate base station. Communications between server 14 and appliance 10 could also be implemented with radio signals. For example, appliance 10 could incorporate a conventional paging receiver.

A particular example of the embodiment illustrated in FIG. 5 is a programmable telephone. Speed dial numbers and other programmable features of a telephone may be conveniently set using a graphical user interface hosted by server 14. Once the features have been programmed by the user, server 14 simply places a call to the telephone. Appropriate data demodulation circuitry is incorporated in the telephone in order to download the data from server 14.

FIG. 6 illustrates a further embodiment of the invention generally similar to that of FIG. 5, but incorporating a transfer device as in the embodiment of FIG. 2. Here, however, transfer device 16’ receives data directly from server 14. As with the previously described embodiment, communication between server 14 and transfer device 16’ may be telephonic or by radio. One example of a transfer device 16’ is embodied as a removable module or “card” of a telephone. Data for an appliance 10 is downloaded from server 14 to the telephone where it is demodulated and stored in the card. The card may then be taken to appliance 10 to transfer the data to the appliance with an infrared or other data link.

Another embodiment of the invention as illustrated in FIG. 6 is a “universal” remote controller that may be coupled to a telecommunications network by means of an RJ-11 jack or equivalent in the manner disclosed by Darbee in U.S. Pat. No. 5,228,077. The remote controller could thus function as a data transfer device in addition to its more conventional remote control functions.

As discussed above, the transfer device or appliance of the present invention preferably receives data by means of an opto-electronic data link. Any suitable source of light modulation may be employed to transmit data to the transfer device or appliance. These include LEDs, incandescent bulbs, LCDs and CRTs. A convenient source of light modulation is the display screen of a local computer. At least a portion of the display of the local computer may be modulated to transmit data to the transfer device.

Most current approaches to video modulation data transfer use sequential pulsing of the video image to provide a

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series of binary 1’s and 0’s. These binary bits are used with framing bits (start and stop bits) to form complete data bytes. Some of the current approaches rely on the scanning CRT image to serialize the data bits by providing a luminance pulse for each data bit. This approach will fail when applied to flat panel LCD screens because these screens do not have a scanning luminance response like that found with the CRT.

Other methods provide a binary bit stream where each bit is produced at the video field rate. For a typical CRT, this provides one binary data bit each 16 msec. (60 fields per second). While this approach is viable for the CRT, it will not work well for flat panel displays. The slow response time of LCD panels mean that only a small number of data bits could be transferred per second. For a passive display, 3 bits would be possible (assuming 300 msec. response time). For active panels, 20 bits could be transferred. Using conventional start and stop bits, a passive panel would then be capable of transmitting 0.3 bytes per second and active panels 2 bytes per second. This is too low a data rate for many applications.

Various modulation schemes are proposed below that are suitable for use with both CRT and LCD displays.

1. LUMINANCE MODULATION

A first approach to data modulation of a display screen employs luminance modulation. This method drives the display with varying levels of intensity. Each intensity level can represent an entire data digit. For example, FIG. 7 illustrates a method using 10 shades of gray to represent a decimal digit. The luminance level for each successive decimal digit or luminance “dwell” is generated as fast as the display can accommodate. For an active matrix LCD panel, 20 dwells could be sent in one second. This allows 20 digits of information per second, which is substantially faster than sending binary data.

The luminance levels are detected by a photodetector in a receiving device. Discrete luminance levels can be generated using several different methods:

a) Gray scales

This method drives a spot on the display to one of several discrete shades of gray. The photodetector in the receiving device can detect the discrete levels and convert each level into a single digit value. Reference levels can also be sent periodically in the data stream to establish the black and white (highest/lowest) luminance levels. This allows the photodetector output to be scaled to more accurately detect each discrete gray level. One limitation to this method is that the gray scale response of the display may not be linear. In fact, gray scale levels are greatly affected by the monitor’s contrast and brightness controls. These controls can be changed by the user and are not predictable or known constants.

b) Chromatic luminance

It is possible to convey various luminance levels by selecting different color combinations. Each color has a luminance component combined with a chroma component. Selecting different colors also selects different luminance levels. For example, dark brown has a low luminance while cyan has a high luminance. Note that what is being detected with this method is luminance—not color. Accurate luminance detection depends on the color response of the display, the monitor contrast, brightness and color settings, and the color response characteristics of the photodetector. Accurate detection using this method typically requires some form of calibration to match the photodetector response to the display color response.

c) Dithering

With reference to FIG. 8, the currently preferred method displays a regular pattern of black and white pixels within a

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region of the display to produce an average luminance level. This “dithering” average level is created by dividing the entire detection region into a matrix of smaller discrete cells comprising one or more pixels. Each cell is either driven full white or full black. The ratio of black to white cells determines the overall, average luminance for the detection area. This method eliminates problems with unpredictable gray scale response in the display due to contrast or brightness settings.

The dithering approach illustrated in FIG. 8 uses a rectangular matrix to obtain an average luminance for a given area. It is also possible to display other graphic patterns or characters which have a distinctive appearance while also presenting an average overall luminance. Some examples are shown in FIG. 9. Each of these have a unique luminance level when the black areas are averaged with the white background. This allows the photodetector to discriminate between unique patterns or characters to convert to a corresponding data value.

d) Multi-color modulation

Another method is to use two or more color channels to provide a means of data modulation. For this method two or more photodetectors are used, each responsive to different portions of the color spectrum. For example, separate red and green photodetectors could be used to detect varying shades of each color. Using two channels allows data encoding using the luminance level of each color channel, or the phase between two color signals. Phase modulation works by modulating the color channels at a given rate, but varying the phase relationship between the two channels as shown in FIG. 10.

To further increase the data density, it is possible to combine modulation of color luminance with color phase. Thus at any given sample interval, three parameters are available: red intensity, green intensity and phase relationship. If eight discrete values of each parameter are used, each sample point can represent 8^3 values or 1 of 512 discrete numerical values per sample. A disadvantage to this method is the requirement for two color-selective detectors. Also, color response can vary between displays, so some type of color calibration may be required.

2. VIDEO BAR CODE

FIG. 11 illustrates another method of data encoding using video bar code modulation. This approach is similar to printed bar codes, but uses a higher density data coding. With this method, a video bar code is displayed across the screen. The user swipes a receiving device across the bar code to read data from the screen. Conventional printed bar codes work by using different spaces between vertical lines. The spacing relationship is translated into binary data bits. Multiple bits are combined to form bytes of data.

Using a video image, data can be represented using luminance levels or color. This allows higher data density because each “bar” in the video bar code can represent an entire decimal digit instead of just a single binary bit. This increases data density by 8 to 10 times compared to conventional bar codes.

FIG. 11 illustrates a video bar code using luminance levels. Note that luminance levels can be generated using the same methods as previously described for spot modulation. Each bar represents one of many luminance levels, for example, with 10 luminance levels each bar can represent a digit value of 0 to 9.

3. COLOR MODULATION

Chromatic luminance modulation was described above as a form of intensity modulation. It is also possible to employ a true color modulation in which specific color hues are used

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to represent corresponding numerical values. Depending on the range of hues used, an array of two or three separate detectors sensitive to different spectral components, such as by using appropriate filters, is required. A beam splitter may be employed to direct light to the individual detectors of the array in the receiving device.

4. SELF CLOCKING

Regardless of the method of modulation employed, it is desirable that the data transmission by self-clocking. This means that individual data characters are detected by the receiving device without precise time spacing between characters. This self-clocking approach allows for pauses to occur during the transmission of data characters without creating transmission errors. Pauses can occur in PCs if the operating system performs another task while the transmission is active. For example, multitasking operating systems will commonly write data between memory cache storage and disk drives. This activity can preempt the operation of other software and cause short pauses in the operation of lower level applications. For internet based data transfers, varying delays are also common when moving data between servers and client PCs.

It is also important to accommodate different data rates depending on the type of display monitor being used. Prior to starting the data transfer, the user can make a selection to indicate the type of display being used. If the display is a CRT, a faster transfer rate may be used (up to 75 digits per second). If an active matrix display is being used the transfer rate will be slower (20 digits per second). While the selection of transfer rate is easily accomplished on the PC side, the receiving device will preferably be compatible with all available transfer rates. Using self clocking data allows the receiving device to receive data at the transmission rate, without the need for a data rate selection on the receiving device itself.

An efficient self-clocking method using a non-binary data encoding is illustrated in FIG. 12. If luminance modulation is used the receiving device can detect each discrete luminance level change as a new digit. The length of time between successive digits is irrelevant. If the same digit value is sent twice in succession, a special “repeat” character can be used to indicate that the last digit value is repeating. As shown in FIG. 12, 11 indicates a repeating digit value. If the data stream contains three successive 4’s, the encoded data will be 4-11-4. With this approach a single digit value is never repeated twice in succession. The detector can simply wait for each change in luminance level to indicate a new digit value has been sent. Timing relationships between characters is not significant.

5. TIME INTERVAL MODULATION

In contrast to self-clocking methods, another modulation approach is based on the time spacing between changes in intensity level or color. With this approach, only a limited number of intensity levels or colors is required. The number of discrete intensity levels or colors may be as few as two. The time interval between changes in intensity level or color has a number of possible discrete values, each of which corresponds to a numerical value. A significant advantage of this approach is that it is not sensitive to variations in display intensity or color fidelity. However, due to the characteristic response times, this approach is better suited to CRT displays than to LCD displays.

6. RECEIVING DEVICE

FIG. 13 is a block diagram of a receiving device suitable for use in connection with the present invention. Light emitted by (or reflected by) a display panel falls on photodetector 202. The output of the photodetector is ampli-

fied by amplifier **204** and asserted at the input of the analog-to-digital (A/D) converter **206**. The digitized output, in this case comprising an 8-bit word, is presented as an input to microcontroller **208**. The operation of microcontroller **208** is controlled by program instructions stored in read only memory (ROM) **210**. These instructions govern the conversion of the raw digitized input from A/D converter **206** into a data digit. The data digits are further processed in accordance with the particular functions to be accomplished by receiving device **200**. When configured as a transfer device, such as transfer device **16** discussed previously, receiving device **200** will further communicate the data digits or information derived therefrom to a host device via a wired or wireless interface. A random access memory (RAM) **212** is coupled to microcontroller **208** for use as a scratchpad memory, the use of which may include temporary storage of the data digits received from A/D converter **206** or information derived therefrom. In many applications, receiving device **200** will include a user interface **214** comprising a display and/or various controls, such as function selection buttons and the like. Receiving device **200** may also include a provision to allow for automatic calibration of the analog to digital converter. A peak detector **216** detects the peak white level in the received signal. This level is used to establish the upper range of A/D converter **206**. This allows the full range of the A/D converter to be used over the receiver's data detection range.

Receiving device **200** may be configured in any convenient form. As discussed above in connection with transfer device **16**, receiving device **200** may have an elongated cylindrical shape similar to a pen or a wand. In such case, photodetector **202** may be conveniently located at one end of the device. However, it has been found that pen- or wand-shaped devices have disadvantages when used with LCD flat screen displays. If the device is pressed against the display, even with light pressure, the display may be distorted, thereby affecting the accuracy of the data transfer. For flat panel displays, a flat, card-shaped receiving device is preferred. Such a device may be held against the display screen without distorting the display.

To ensure proper registration of the receiving device with the display screen, a visual indication of the area of the display screen that will contain the data modulation is preferably provided. As shown in FIG. **14**, a rectangular area of the display screen, generally corresponding in size and shape to the card-shaped receiving device, may be configured as a window and may be labeled with a legend such as "place card here".

In the examples discussed above, a single photodetector (or paired detectors in the case of bi-color modulation) is used in combination with a single modulated region of the display screen. It will be appreciated that the data transfer rate can be multiplied by employing a suitable array of photodetectors in combination with a corresponding array of data transmission regions. Obviously, the array of detectors must be properly registered with the array of modulated regions on the display. This can present a challenge in the case of a handheld receiving device. One solution to this challenge is illustrated in FIG. **14**. Here, the display is divided into four quadrants that are independently modulated. The receiving device includes an array of four independent photodetectors. By providing simple registration marks on both the display screen and the receiving device, the receiving device can be held against the display screen so that the photodetectors are in proper registration with the corresponding quadrants.

7. EXPERIMENTAL RESULTS

A prototype system has been constructed. The prototype receiving device is configured as a card having the same length and width as a standard credit card. A 9 mm round photodetector element is located in the center of one face of the card. Electronic circuitry within the card amplifies the output signal of the photodetector, which is then applied as an analog input to a conventional personal computer system where A/D conversion is performed. The photodetector element is designed to detect the average luminance over a 9 mm round area of the display screen. The detector consists of a translucent glass window and a photo-Darlington transistor photodetector mounted in a plastic enclosure.

The prototype system employs luminance modulation using the dithering approach discussed above. A total of 12 luminance levels are used to represent ten decimal values plus two additional values to indicate formatting and repeating characters. Using a CRT display, the prototype system has achieved data transfer rates of 20 characters per second.

The photodetector in the receiver detects the luminance change as the electron beam in the CRT passes over the detector. This screen phosphor glows with a brightness related to the average screen luminance. For a CRT display, the beam is constantly scanning the screen. This creates a pulse as the beam passes over the detector. Therefore, the signal detected is a pulse which repeats at the frame rate of the display (typically 13 to 17 msec. per field). FIG. **15** is an actual capture of the signal received by the detector using a CRT-based display.

Since the received signal is a pulse, a software algorithm processes the A/D conversion readings in order to establish the luminance level represented by the peaks of the detected pulses. The software algorithm is then capable of decoding these levels back into packets of data.

It is desirable for the system to automatically adapt to varying intensity levels on the display. Different luminance levels will result due to variances in the brightness response of the display, the sensitivity characteristics of the photodetector and also due to adjustment of the brightness and contrast settings of the monitor.

To automatically adjust for these differences, the system provides a calibration sequence at the start of each data transmission. As illustrated in FIG. **16**, the calibration pattern consists of a staircase of each of the 12 luminance levels used. A full white pulse (level **12**) is sent at the start of the sequence, followed by values of 0 to 12. This signal is detected by the receiver and used to establish the actual 12 discrete levels obtained from the monitor. In FIG. **16**, the bottom signal is the actual pulse waveform received by the photodetector. The top signal is that obtained after processing by a software algorithm.

It will be recognized that the above-described invention may be embodied in other specific forms without departing from the spirit or essential characteristics of the disclosure. Thus, it is understood that the invention is not to be limited by the foregoing illustrative details, but rather is to be defined by the appended claims.

What is claimed is:

1. A method for setting programmable features of an appliance comprising:

- providing an interactive site on a global computer network;
- providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an optical sensor;

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establishing a connection with the interactive site using a computer with a display screen;
interactively setting programmable features of the virtual appliance using the graphical user interface at the interactive site;
downloading set-up data for the programmable features from the interactive site to the computer;
removing the transfer device from the real appliance;
positioning the transfer device in proximity to the display screen;
modulating the display screen to transfer the set-up data to the transfer device via the optical sensor;
returning the transfer device to the real appliance;
inserting the transfer device into a docking port in the real appliance; and
using the set-up data to set the programmable features of the real appliance.
2. The method of claim 1 wherein the output port of the transfer device and the docking port having cooperating electrical contacts.
3. A method for setting programmable features of an appliance comprising:
providing an interactive site on a global computer network;
providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an input port;
establishing a connection with the interactive site using a computer;
interactively setting programmable features of the virtual appliance using the graphical user interface at the interactive site;
downloading set-up data for the programmable features from the interactive site to the computer;
removing the transfer device from the real appliance;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
returning the transfer device to the real appliance;
using the set-up data to set the programmable features of the real appliance;
setting programmable features of the real appliance by user input at the real appliance;
coupling the input port of the transfer device to the computer; and
transferring the user-input settings to the computer.
4. The method of claim 3 further comprising inserting the transfer device into a docking port in the real appliance.
5. The method of claim 4 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.
6. The method of claim 3 wherein the interactive site is accessed via the World Wide Web.
7. The method of claim 3 wherein the input port of the transfer device is coupled to a serial port of the computer.
8. The method of claim 7 wherein the input port of the transfer device is plugged into the serial port.
9. The method of claim 7 wherein the input port of the transfer device is coupled to the serial port by a cable.

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10. The method of claim 3 further comprising:
establishing a connection with the interactive site using the computer; and
uploading the user-input settings to the interactive site.
11. The method of claim 3 wherein the programmable features comprise internal software of the real appliance.
12. The method of claim 11 wherein the internal software comprises operating system software.
13. The method of claim 3 wherein the programmable features comprise a control having a user-assigned function.
14. A method for setting programmable features of an appliance comprising:
providing an interactive site on a global computer network;
providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;
establishing a connection between a user's computer and the interactive site;
entering data with the user's computer to set programmable features of the virtual appliance at the interactive site;
providing a portable transfer device separate from the user's computer having an optical sensor and an output port;
downloading set-up data for the programmable features from the interactive site to the user's computer;
modulating at least a portion of the display coupled to the user's computer;
sensing the modulation with the optical sensor of the transfer device so as to receive the set-up data;
inserting the transfer device into a docking port in the real appliance;
coupling the output port of the transfer device to the appliance; and
transferring the set-up data from the transfer device to the real appliance.
15. The method of claim 14 wherein the output port of the transfer device and the docking port having cooperating electrical contacts.
16. A method for setting programmable features of an appliance comprising:
providing an interactive site on a global computer network;
providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;
establishing a connection between a user's computer and the interactive site;
entering data with the user's computer to set programmable features of the virtual appliance at the interactive site;
providing a portable transfer device separate from the user's computer having an input port and an output port;
downloading set-up data for the programmable features from the interactive site to the user's computer;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;

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coupling the output port of the transfer device to the appliance;
transferring the set-up data from the transfer device to the real appliance;
setting programmable features of the real appliance by user input at the real appliance;
coupling the transfer device to the computer; and
transferring the user-input settings to the computer.

17. The method of claim 16 further comprising inserting the transfer device into a docking port in the real appliance.

18. The method of claim 17 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

19. The method of claim 16 wherein the interactive site is accessed via the World Wide Web.

20. The method of claim 16 wherein the input port of the transfer device is coupled to a serial port of the computer.

21. The method of claim 20 wherein the input port of the transfer device is plugged into the serial port.

22. The method of claim 20 wherein the input port of the transfer device is coupled to the serial port by a cable.

23. The method of claim 16 further comprising:
establishing a connection with the interactive site using the computer; and
uploading the user-input settings to the interactive site.

24. The method of claim 16 wherein the transfer device comprises a key to operate the real appliance.

25. The method of claim 16 wherein the programmable features comprise internal software of the real appliance.

26. The method of claim 25 wherein the internal software comprises operating system software.

27. The method of claim 16 wherein the programmable features comprise a control having a user-assigned function.

28. A method for setting programmable features of an appliance comprising:

providing an interactive computer program with a graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

setting programmable features of the virtual appliance at a user's computer;

providing a portable transfer device having an input port and an output port;

coupling the input port of the transfer device to the user's computer;

downloading set-up data for the programmable features from the user's computer to the transfer device;

coupling the output port of the transfer device to the appliance; and

transferring the set-up data from the transfer device to the real appliance;

wherein the transfer device comprises a key for the real appliance; and

wherein the transfer device provides access to a space containing the real appliance.

29. A method for setting programmable features of an appliance comprising:

providing an interactive computer program with a graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

setting programmable features of the virtual appliance at a user's computer;

providing a portable transfer device having an input port and an output port;

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coupling the input port of the transfer device to the user's computer;

downloading set-up data for the programmable features from the user's computer to the transfer device;

coupling the output port of the transfer device to the appliance; and

transferring the set-up data from the transfer device to the real appliance;

wherein the real appliance comprises an automobile; and

wherein the transfer device comprises a key for the automobile.

30. A method for diagnosing a fault in an appliance comprising:

providing an appliance support facility;

establishing a communication connection between an appliance and an appliance user's computer;

sending diagnostic data from the appliance to the appliance user's computer;

establishing a communication connection between the appliance user's computer and the appliance support facility;

sending the diagnostic data from the appliance user's computer to the appliance support facility; and

processing the diagnostic data at the appliance support facility to diagnose a fault in the appliance.

31. The method of claim 30 further comprising issuing a repair order from the appliance support facility in accordance with the fault diagnosis.

32. The method of claim 30 further comprising downloading corrective data from the appliance support facility to the appliance user's computer.

33. The method of claim 32 wherein the corrective data comprises corrective software.

34. The method of claim 33 further comprising transferring the corrective data from the appliance user's computer to the appliance.

35. The method of claim 32 wherein transferring the corrective data comprises transferring the corrective data from the appliance user's computer to a transfer device and then transferring the corrective data from the transfer device to the appliance.

36. The method of claim 30 wherein transferring the diagnostic data comprises transferring the diagnostic data from the appliance to a transfer device and then transferring the diagnostic data from the transfer device to the appliance user's computer.

37. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a computer with a display screen, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an optical sensor;

interactively setting programmable features of the virtual appliance using the graphical user interface to generate set-up data;

removing the transfer device from the real appliance; positioning the transfer device in proximity to the display screen;

modulating the display screen to transfer the set-up data to the transfer device via the optical sensor;

returning the transfer device to the real appliance;

inserting the transfer device into a docking port in the real appliance; and

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using the set-up data to set the programmable features of the real appliance.

38. The method of claim 37 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

39. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an input port;

interactively setting programmable features of the virtual appliance using the graphical user interface to generate set-up data;

removing the transfer device from the real appliance;

coupling the input port of the transfer device to the computer;

transferring the set-up data from the computer to the transfer device;

returning the transfer device to the real appliance; and using the set-up data to set the programmable features of the real appliance;

setting programmable features of the real appliance by user input at the real appliance;

coupling the input port of the transfer device to the computer; and

transferring the user-input settings to the computer.

40. The method of claim 39 further comprising inserting the transfer device into a docking port in the real appliance.

41. The method of claim 40 wherein the output port of the transfer device and the docking port having cooperating electrical contacts.

42. The method of claim 39 wherein the input port of the transfer device is coupled to a serial port of the computer.

43. The method of claim 42 wherein the input port of the transfer device is plugged into the serial port.

44. The method of claim 42 wherein the input port of the transfer device is coupled to the serial port by a cable.

45. The method of claim 39 wherein the programmable features comprise internal software of the real appliance.

46. The method of claim 45 wherein the internal software comprises operating system software.

47. The method of claim 39 wherein the programmable features comprise a control having a user-assigned function.

48. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a user's computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

entering data with the user's computer to set programmable features of the virtual appliance to generate set-up data;

providing a portable transfer device separate from the user's computer having an optical sensor and an output port;

modulating at least a portion of a display coupled to the user's computer to optically transmit the set-up data;

sensing the modulation with the optical sensor of the transfer device so as to receive the set-up data;

inserting the transfer device into a docking port in the real appliance;

coupling the output port of the transfer device to the appliance; and

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transferring the set-up data from the transfer device to the real appliance.

49. The method of claim 48 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

50. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a user's computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

entering data with the user's computer to set programmable features of the virtual appliance to generate set-up data;

providing a portable transfer device separate from the user's computer having an input port and an output port;

coupling the input port of the transfer device to the computer;

transferring the set-up data from the computer to the transfer device;

inserting the transfer device into a docking port in the real appliance;

coupling the output port of the transfer device to the appliance; and

transferring the set-up data from the transfer device to the real appliance.

51. The method of claim 50 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

52. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a user's computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

entering data with the user's computer to set programmable features of the virtual appliance to generate set-up data;

providing a portable transfer device separate from the user's computer having an input port and an output port;

coupling the input port of the transfer device to the computer;

transferring the set-up data from the computer to the transfer device;

coupling the output port of the transfer device to the appliance;

transferring the set-up data from the transfer device to the real appliance;

setting programmable features of the real appliance by user input at the real appliance;

coupling the transfer device to the computer; and

transferring the user-input settings to the computer.

53. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a user's computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

entering data with the user's computer to set programmable features of the virtual appliance to generate set-up data;

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providing a portable transfer device separate from the user's computer having an input port and an output port;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
coupling the output port of the transfer device to the appliance; and
transferring the set-up data from the transfer device to the real appliance; and
wherein the transfer device comprises a key to operate the real appliance.
54. A method for setting programmable features of an appliance comprising:
providing an interactive site on a global computer network;
providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an input port;
establishing a connection with the interactive site using a computer;
interactively setting programmable features of the virtual appliance using the graphical user interface at the interactive site;
downloading set-up data for the programmable features from the interactive site to the computer;
removing the transfer device from the real appliance;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
returning the transfer device to the real appliance;
inserting the transfer device into a docking port in the real appliance; and
using the set-up data to set the programmable features of the real appliance.
55. The method of claim 54 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.
56. A method for setting programmable features of an appliance comprising:
providing an interactive site on a global computer network;
providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;
establishing a connection between a user's computer and the interactive site;
entering data with the user's computer to set programmable features of the virtual appliance at the interactive site;
providing a portable transfer device separate from the user's computer having an input port and an output port;
downloading set-up data for the programmable features from the interactive site to the user's computer;
coupling the input port of the transfer device to the computer;

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transferring the set-up data from the computer to the transfer device;
inserting the transfer device into a docking port in the real appliance;
coupling the output port of the transfer device to the appliance; and
transferring the set-up data from the transfer device to the real appliance.
57. The method of claim 56 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.
58. A method for setting programmable features of an appliance comprising:
providing an interactive site on a global computer network;
providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;
establishing a connection between a user's computer and the interactive site;
entering data with the user's computer to set programmable features of the virtual appliance at the interactive site;
providing a portable transfer device separate from the user's computer having an input port and an output port;
downloading set-up data for the programmable features from the interactive site to the user's computer;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
coupling the output port of the transfer device to the appliance; and
transferring the set-up data from the transfer device to the real appliance;
wherein the transfer device comprises a key to operate the real appliance.
59. A method for setting programmable features of an appliance comprising:
operating a graphical user interface using a computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an input port;
interactively setting programmable features of the virtual appliance using the graphical user interface to generate set-up data;
removing the transfer device from the real appliance;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
returning the transfer device to the real appliance;
inserting the transfer device into a docking port in the real appliance; and
using the set-up data to set the programmable features of the real appliance.
60. The method of claim 59 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,882,712 B1
APPLICATION NO. : 10/155531
DATED : April 19, 2005
INVENTOR(S) : Jerry Iggulden and Kyle Fields

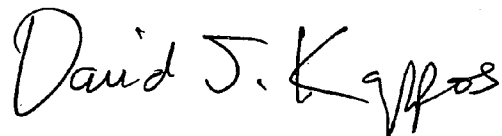
Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Col. 18, claims 30-36 are cancelled.

Signed and Sealed this

Twenty-third Day of November, 2010

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive, flowing style.

David J. Kappos
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,882,712 B1
APPLICATION NO. : 10/155531
DATED : April 19, 2005
INVENTOR(S) : Jerry Iggulden and Kyle Fields

Page 1 of 8

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Delete the Title Page and substitute therefore the attached Title Page showing the corrected number of claims in patent.

Col. 18, lines 13-48, claims 30-36 are cancelled.

Column 18, line 49-Column 22, line 65, claims 37-60 are renumbered as claims 30-53 as shown.

30. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a computer with a display screen, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an optical sensor;

interactively setting programmable features of the virtual appliance using the graphical user interface to generate set-up data;

removing the transfer device from the real appliance;

positioning the transfer device in proximity to the display screen;

modulating the display screen to transfer the set-up data to the transfer device via

the optical sensor;

returning the transfer device to the real appliance;

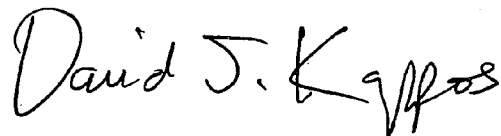
inserting the transfer device into a docking port in the real appliance; and

using the set-up data to set the programmable features of the real appliance.

This certificate supersedes the Certificate of Correction issued November 23, 2010.

Signed and Sealed this

Twenty-first Day of December, 2010



David J. Kappos
Director of the United States Patent and Trademark Office

CERTIFICATE OF CORRECTION (continued)
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31. The method of claim 30 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

32. A method for setting programmable features of an appliance comprising:
operating a graphical user interface using a computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an input port;
interactively setting programmable features of the virtual appliance using the graphical user interface to generate set-up data;
removing the transfer device from the real appliance;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
returning the transfer device to the real appliance; and
using the set-up data, to set the programmable features of the real appliance;
setting programmable features of the real appliance by user input at the real appliance;
coupling the input port of the transfer device to the computer; and
transferring the user-input settings to the computer.

33. The method of claim 32 further comprising inserting the transfer device into a docking port in the real appliance.

34. The method of claim 33 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

35. The method of claim 32 wherein the input port of the transfer device is coupled to a serial port of the computer.

36. The method of claim 35 wherein the input port of the transfer device is plugged into the serial port.

37. The method of claim 35 wherein the input port of the transfer device is coupled to the serial port by a cable.

CERTIFICATE OF CORRECTION (continued)
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38. The method of claim 32 wherein the programmable features comprise internal software of the real appliance.

39. The method of claim 38 wherein the internal software comprises operating system software.

40. The method of claim 32 wherein the programmable features comprise a control having a user-assigned function.

41. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a user's computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

entering data with the user's computer to set programmable features of the virtual appliance to generate set-up data;

providing a portable transfer device separate from the user's computer having an optical sensor and an output port;

modulating at least a portion of a display coupled to the user's computer to optically transmit the set-up data;

sensing the modulation with the optical sensor of the transfer device so as to receive the set-up data;

inserting the transfer device into a docking port in the real appliance;

coupling the output port of the transfer device; to the appliance; and

transferring the set-up data from the transfer device to the real appliance.

42. The method of claim 41 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

43. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a user's computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

entering data with the user's computer to set programmable features of the virtual appliance to generate set-up data;

CERTIFICATE OF CORRECTION (continued)
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providing a portable transfer device separate from the user's computer having an input port and an output port;

coupling the input port of the transfer device to the computer;

transferring the set-up data from the computer to the transfer device;

inserting the transfer device into a docking port in the real appliance;

coupling the output port of the transfer device to the appliance; and

transferring the set-up data from the transfer device to the real appliance.

44. The method of claim 43 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

45. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a user's computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;

entering data with the user's computer to set programmable features of the virtual appliance to generate set-up data;

providing a portable transfer device separate from the user's computer having an input port and an output port;

coupling the input port of the transfer device to the computer;

transferring the set-up data from the computer to the transfer device;

coupling the output port of the transfer device to the appliance;

transferring the set-up data from the transfer device to the real appliance;

setting programmable features of the real appliance by user input at the real appliance;

coupling the transfer device to the computer; and

transferring the user-input settings to the computer.

CERTIFICATE OF CORRECTION (continued)
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46. A method for setting programmable features of an appliance comprising:
operating a graphical user interface using a user's computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;
entering data with the user's computer to set programmable features of the virtual appliance to generate set-up data;
providing a portable transfer device separate from the user's computer having an input port and an output port;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
coupling the output port of the transfer device to the appliance; and
transferring the set-up data from the transfer device to the real appliance; and
wherein the transfer device comprises a key to operate the real appliance.

47. A method for setting programmable features of an appliance comprising:
providing an interactive site on a global computer network;
providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an input port;
establishing a connection with the interactive site using a computer;
interactively setting programmable features of the virtual appliance using the graphical user interface at the interactive site;
downloading set-up data for the programmable features from the interactive site to the computer;
removing the transfer device from the real appliance;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
returning the transfer device to the real appliance;
inserting the transfer device into a docking port in the real appliance; and
using the set-up data to set the programmable features of the real appliance.

48. The method of claim 47 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

CERTIFICATE OF CORRECTION (continued)
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49. A method for setting programmable features of an appliance comprising:

- providing an interactive site on a global computer network;
- providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;
- establishing a connection between a user's computer and the interactive site;
- entering data with the user's computer to set programmable features of the virtual appliance at the interactive site;
- providing a portable transfer device separate from the user's computer having an input port and an output port;
- downloading set-up data for the programmable features from the interactive site to the user's computer;
- coupling the input port of the transfer device to the computer;
- transferring the set-up data from the computer to the transfer device;
- inserting the transfer device into a docking port in the real appliance;
- coupling the output port of the transfer device to the appliance; and
- transferring the set-up data from the transfer device to the real appliance.

50. The method of claim 49 wherein the output port of the transfer device and the docking port have cooperating electrical contacts.

51. A method for setting programmable features of an appliance comprising:

- providing an interactive site on a global computer network;
- providing a graphical user interface at the interactive site, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance;
- establishing a connection between a user's computer and the interactive site;
- entering data with the user's computer to set programmable features of the virtual appliance at the interactive site;
- providing a portable transfer device separate from the user's computer having an input port and an output port;
- downloading set-up data for the programmable features from the interactive site to the user's computer;

CERTIFICATE OF CORRECTION (continued)

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coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
coupling the output port of the transfer device to the appliance; and
transferring the set-up data from the transfer device to the real appliance;
wherein the transfer device comprises a key to operate the real appliance.

52. A method for setting programmable features of an appliance comprising:

operating a graphical user interface using a computer, said graphical user interface having a virtual appliance that graphically depicts programmable features of a corresponding real appliance, said real appliance including a removable transfer device having an input port;

interactively setting programmable features of the virtual appliance using the graphical user interface to generate set-up data;

removing the transfer device from the real appliance;
coupling the input port of the transfer device to the computer;
transferring the set-up data from the computer to the transfer device;
returning the transfer device to the real appliance;
inserting the transfer device into a docking port in the real appliance; and
using the set-up data to set the programmable features of the real appliance.

53. The method of claim 52 wherein the output port of the transfer device and the docking port having cooperating electrical contacts.

CERTIFICATE OF CORRECTION (continued)

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(12) **United States Patent**
Iggulden et al.(10) **Patent No.:** **US 6,882,712 B1**
(45) **Date of Patent:** ***Apr. 19, 2005**(54) **METHOD AND APPARATUS FOR SETTING
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4,999,617 A 3/1991 Uemura et al.(75) Inventors: **Jerry Iggulden**, Santa Monica, CA
(US), **Kyle Fields**, El Dorado Hills, CA
(US)

(Continued)

(73) Assignee: **Pointset Corporation**, Los Angeles, CA
(US)

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(*) Notice: Subject to any disclaimer, the term of this
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U.S.C. 154(b) by 0 days.EP 0803808 4/1997
WO WO 97/18636 5/1997
WO WO 97/30375 8/1997
WO WO 98/38570 9/1998This patent is subject to a terminal dis-
claimer.

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(63) Continuation-in-part of application No. 09/415,299, filed on
Oct. 8, 1999, now Pat. No. 6,483,906, which is a continu-
ation-in-part of application No. 09/351,270, filed on Jul. 12,
1999, now Pat. No. 6,256,378, which is a continuation in-
part of application No. 09/235,709, filed on Jan. 22, 1999,
now Pat. No. 6,415,024.(51) Int. Cl.⁷ **H04M 11/00**(52) U.S. Cl. **379/102.03; 379/102.01;**
379/93.17; 379/90.01(58) Field of Search **379/102.03, 102.01,**
379/102.02, 110.01, 90.01, 93.17, 93.25;
345/329, 970, 339, 336; 709/220, 221,
222, 217, 218; 359/163, 142(56) **References Cited**

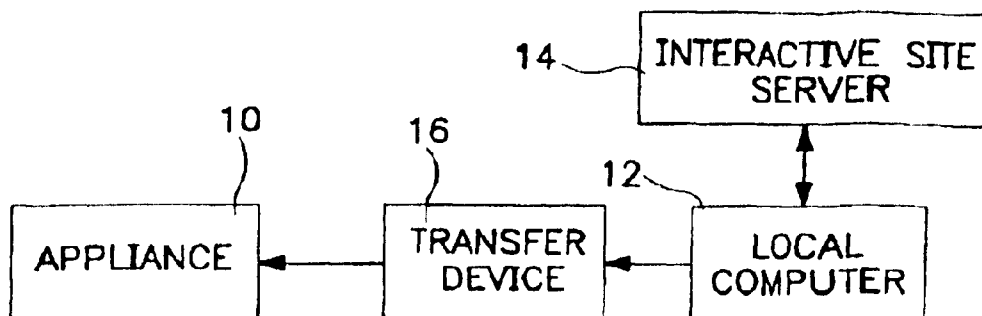
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Primary Examiner—Stella Woo

(74) Attorney, Agent, or Firm—Blakely Sokoloff Taylor &
Zafman, LLP(57) **ABSTRACT**An interactive interface facilitates the setting of preferences
and other programmable parameters of an appliance. The
interface is hosted by a server on a global computer network.
The appliance owner initiates a connection to the server and
is presented with a graphical user interface for setting the
preferences and features of the appliance. Once the desired
settings have been made, they are downloaded to the appli-
ance either directly from the server or the appliance owner's
computer or indirectly using a portable transfer device.

53 Claims, 7 Drawing Sheets





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(19) **United States**

(12) **Patent Application Publication**

Graziano et al.

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(43) **Pub. Date: Aug. 15, 2002**

(54) **WEB-BASED SYSTEM FOR MONITORING AND/OR CONTROLLING HOME DEVICES**

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Publication Classification

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(52) **U.S. Cl.** **700/17; 700/19**

(57) **ABSTRACT**

A web-based system that includes one or more remote devices, a web-based host, a network, and one or more homes is provided. A user can connect to the web-based host using a remote device via a network such as the Internet. The web-based host provides the user with an interface for monitoring and/or controlling home devices in the user's home. Via the interface, the user can select one or more home devices in the user's home to monitor and/or control. The web-based host receives the user's selections and communicates the user's selections to the user's home via the network. The user's home then receives the user's selections and causes monitoring information to be obtained from selected home devices and/or causes the behavior of selected home devices to be controlled according to the user's selections. The user's home can then communicate monitoring and/or other information related to the home devices to the web-based host via the network. The web-based host then communicates the monitoring and/or other information related to the home devices to the remote device via the network where the information is displayed.

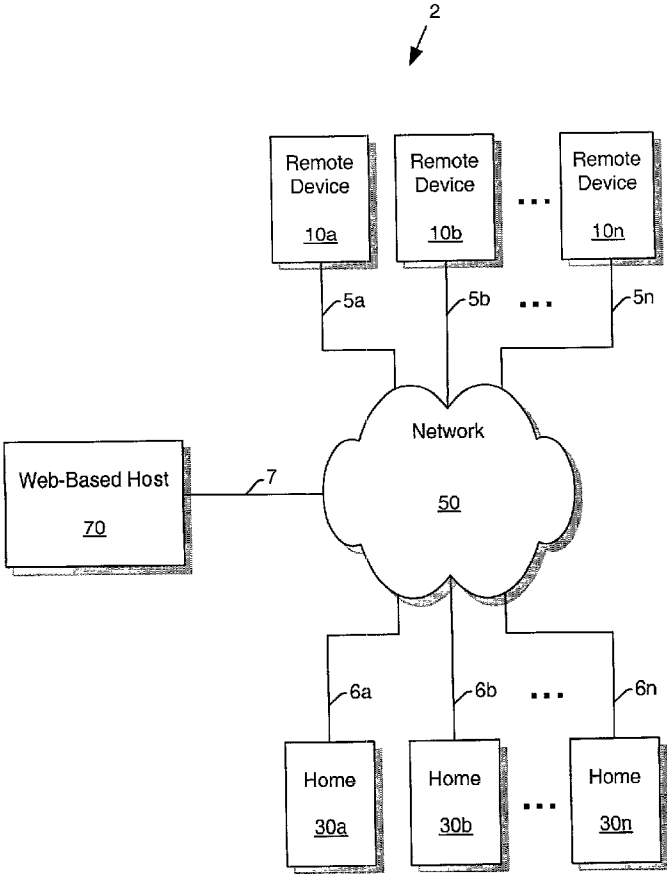


FIG. 1

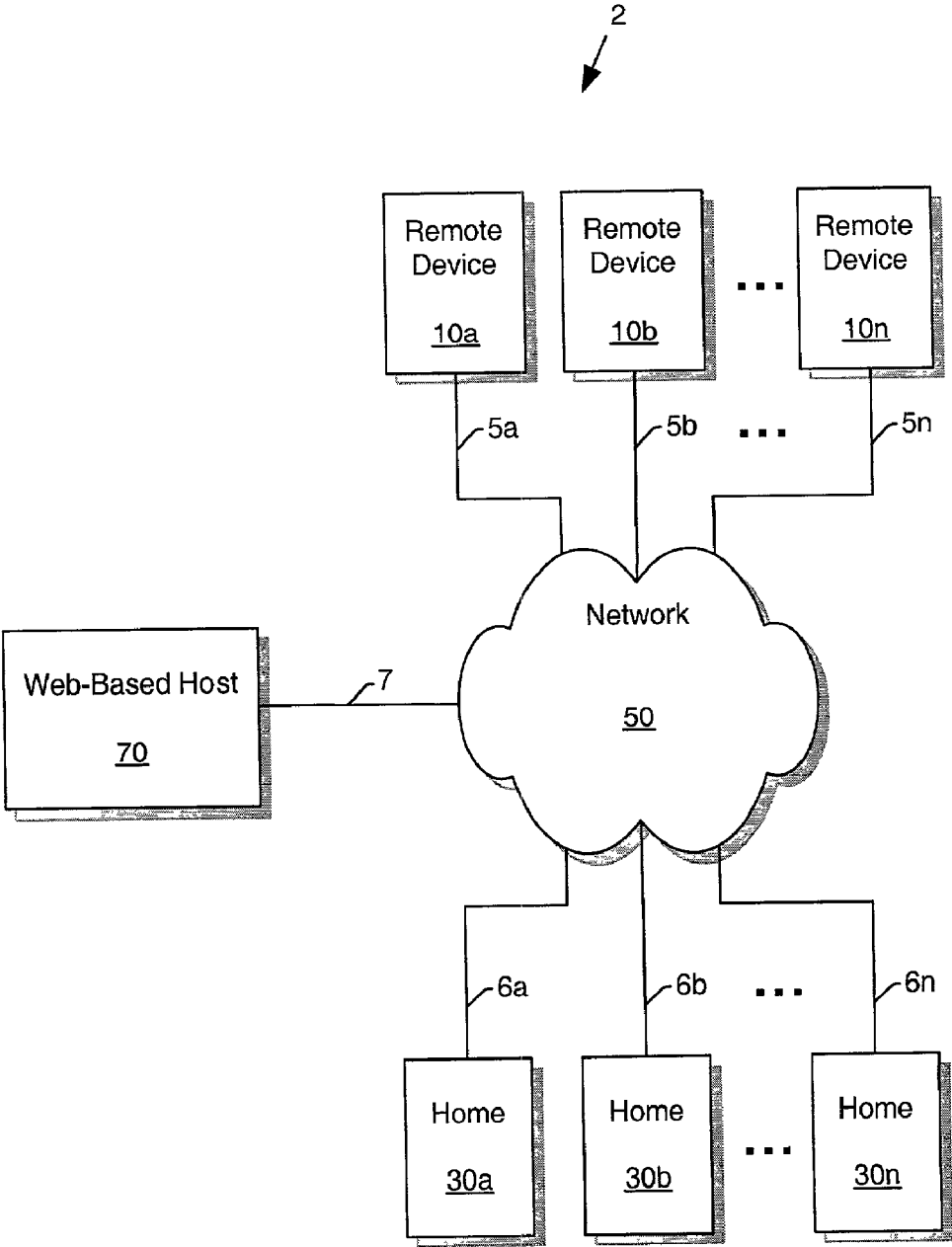


FIG. 2A

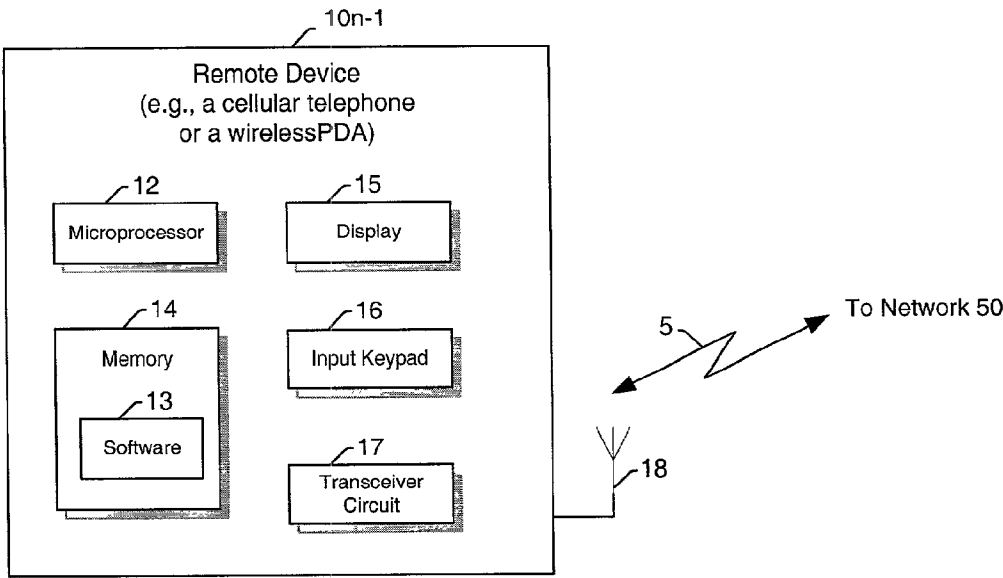


FIG. 2B

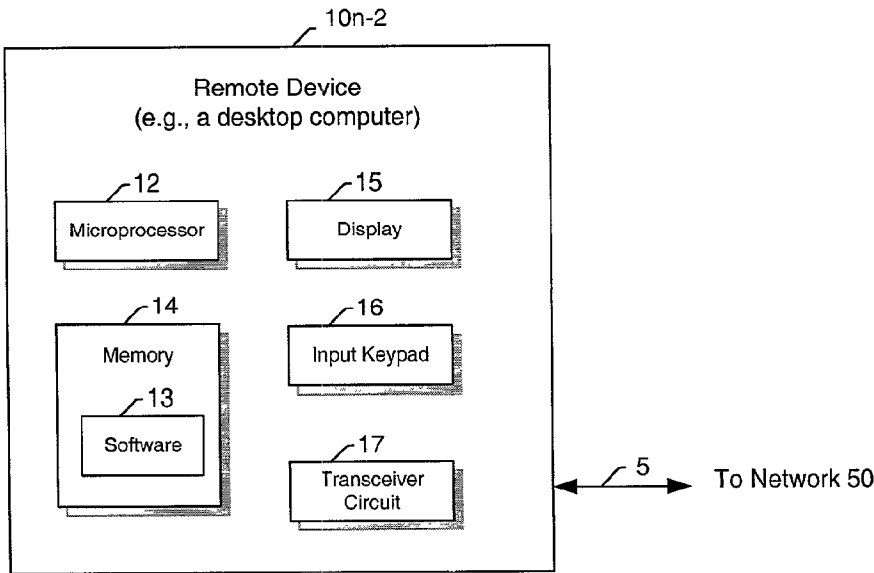


FIG. 3

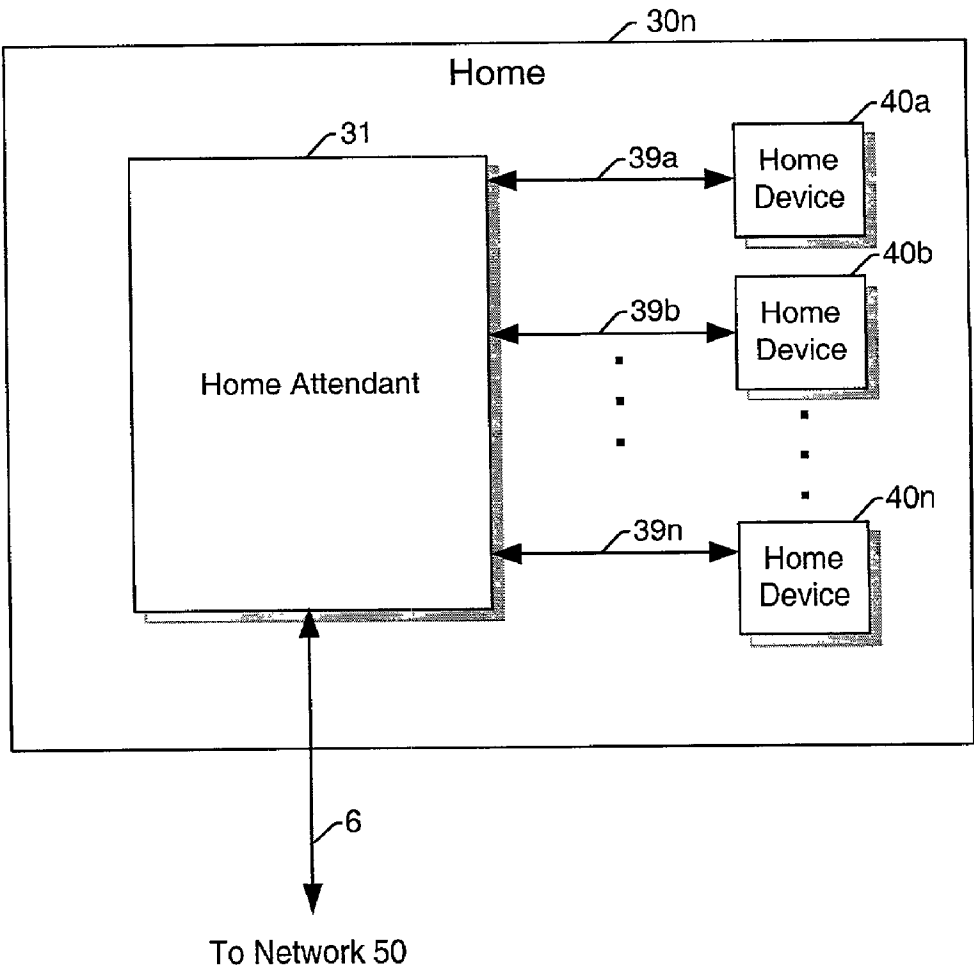


FIG. 4A

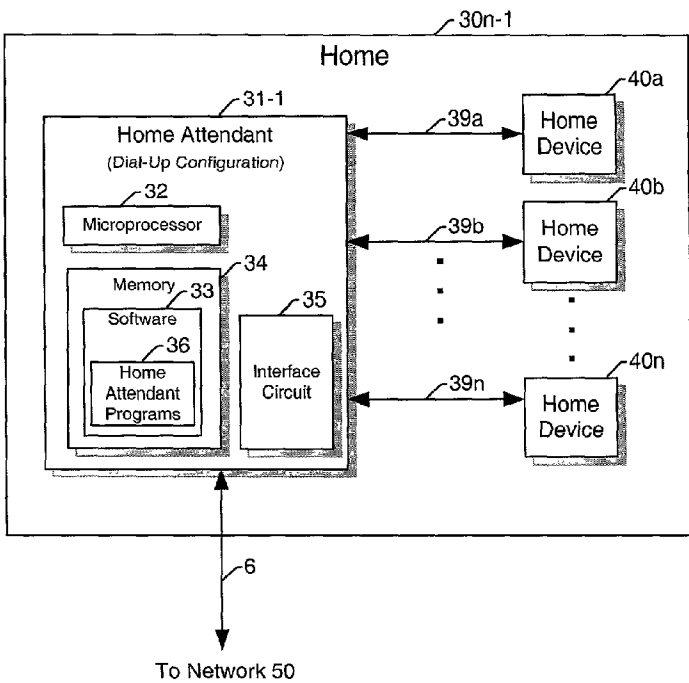


FIG. 4B

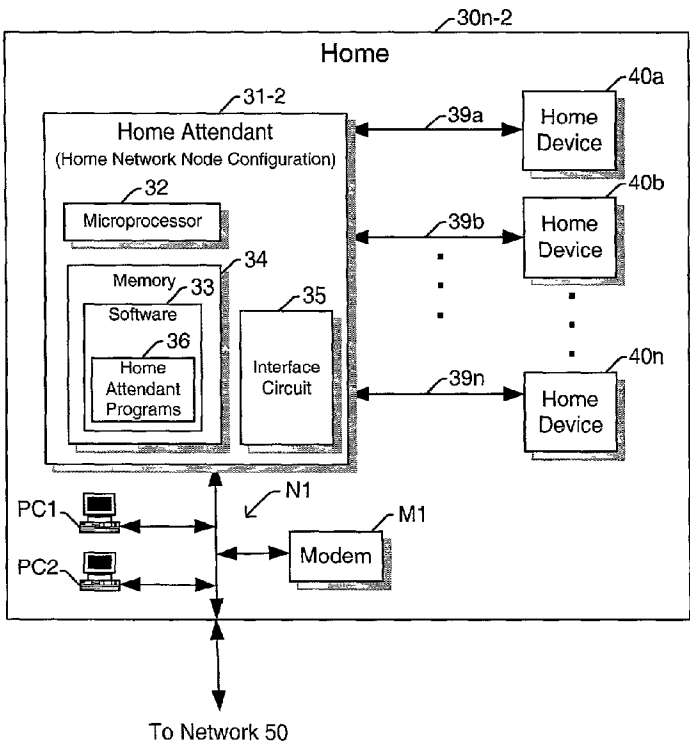


FIG. 4C

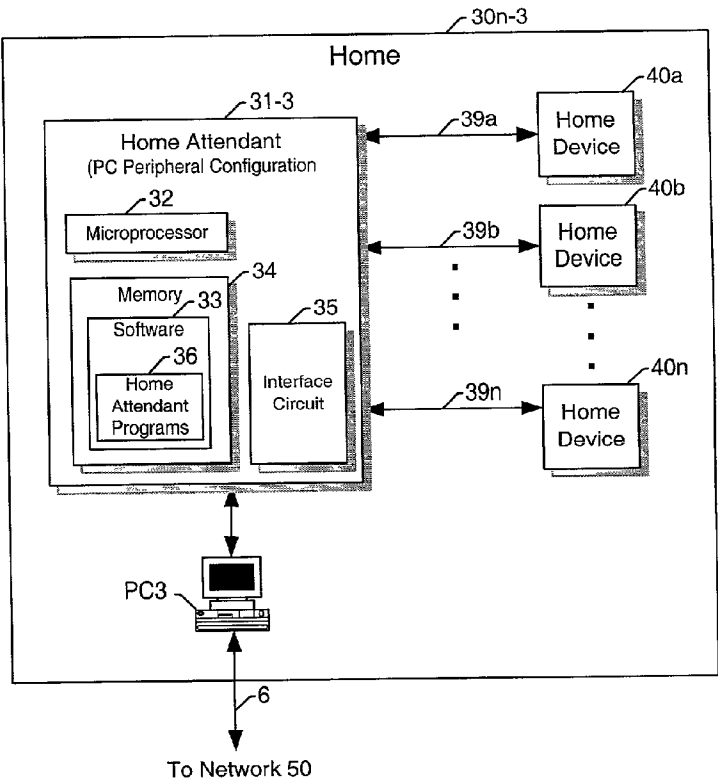


FIG. 4D

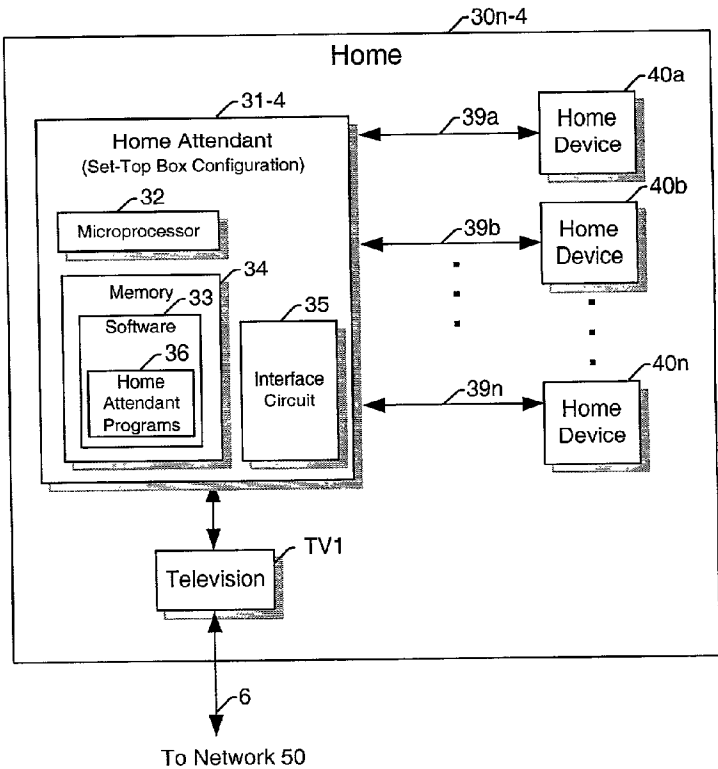


FIG. 5A

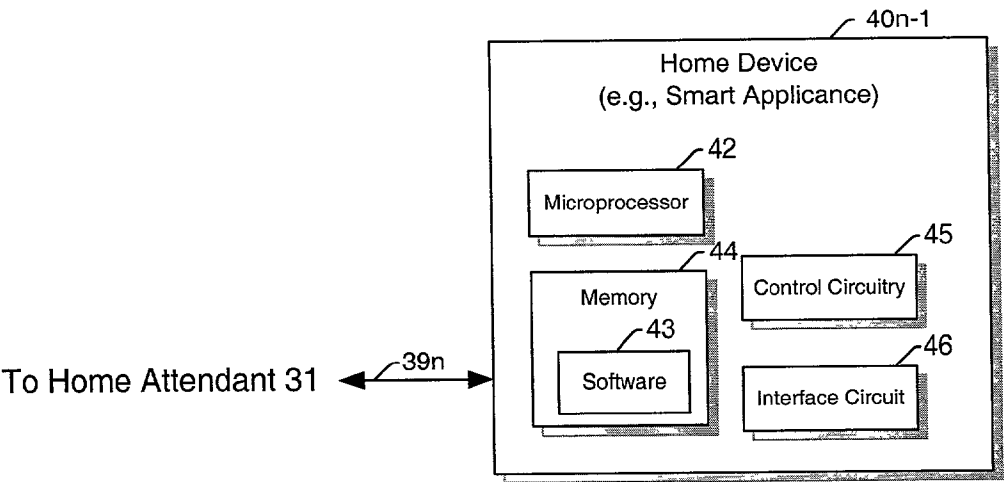


FIG. 5B

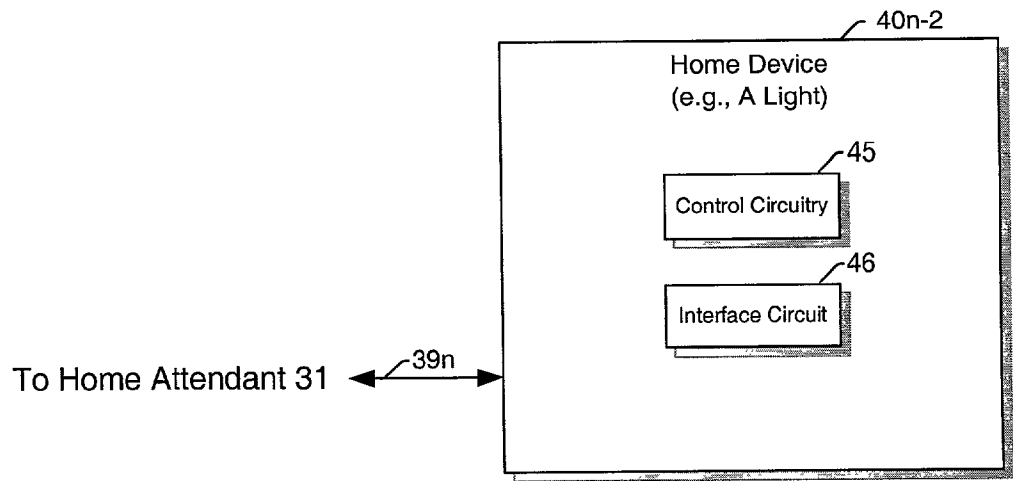


FIG. 6

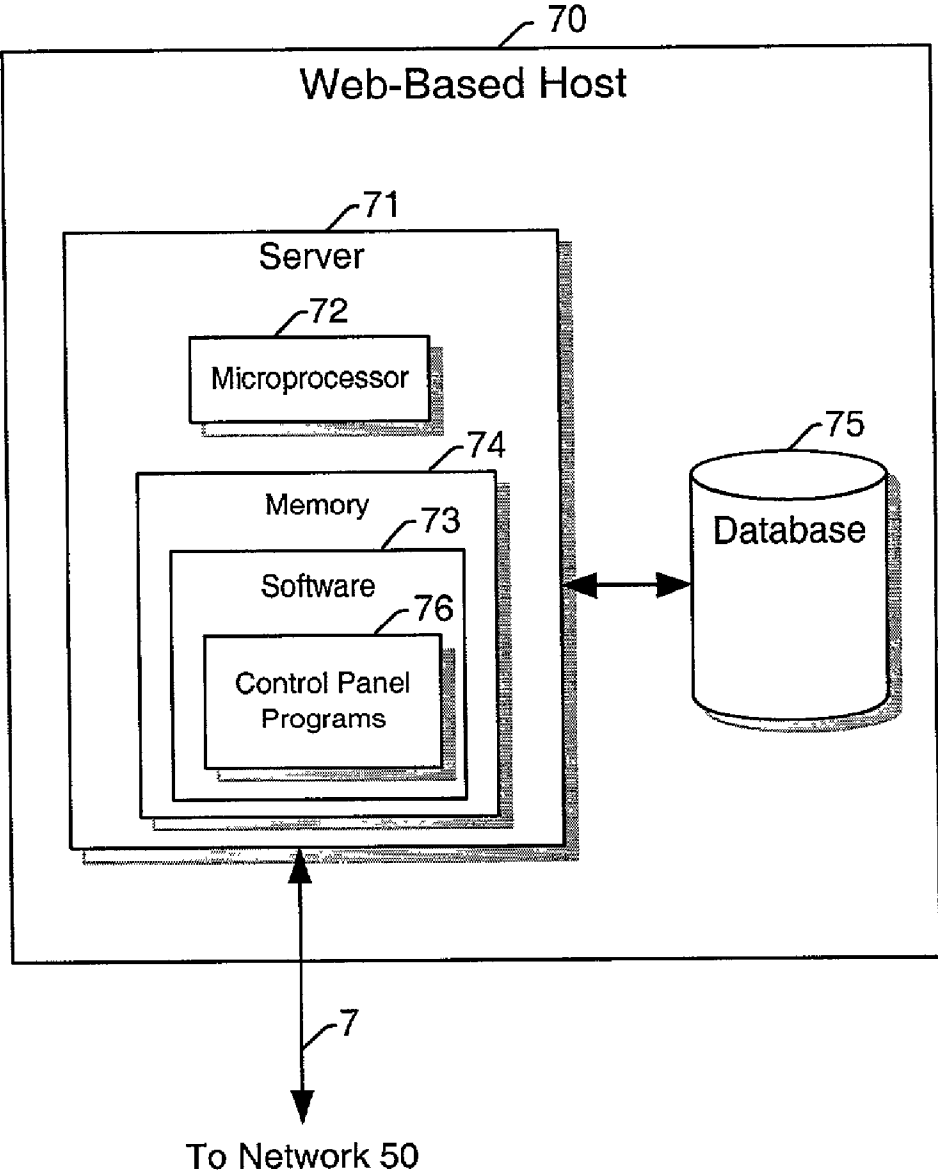


FIG. 7

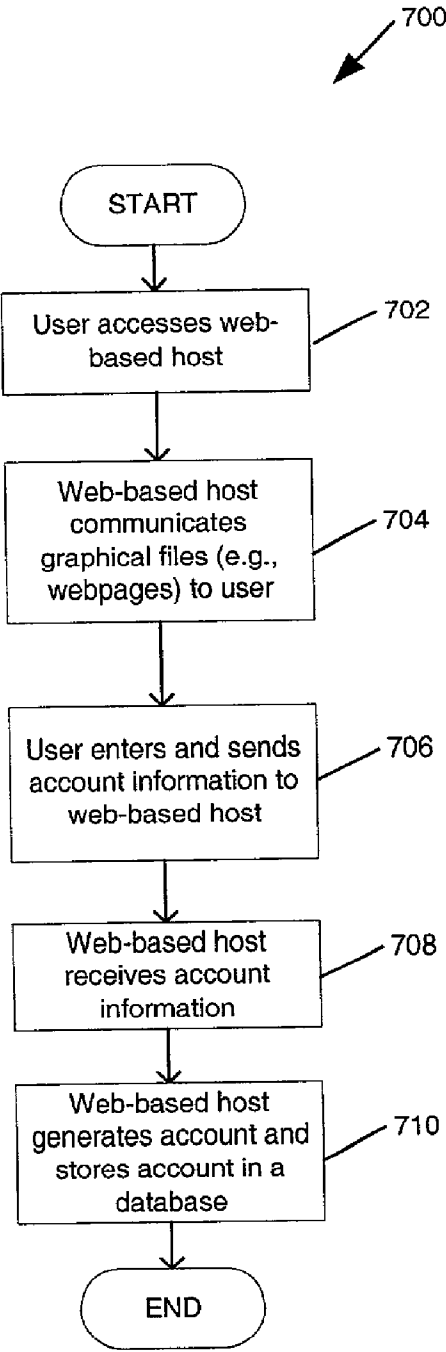


FIG. 8

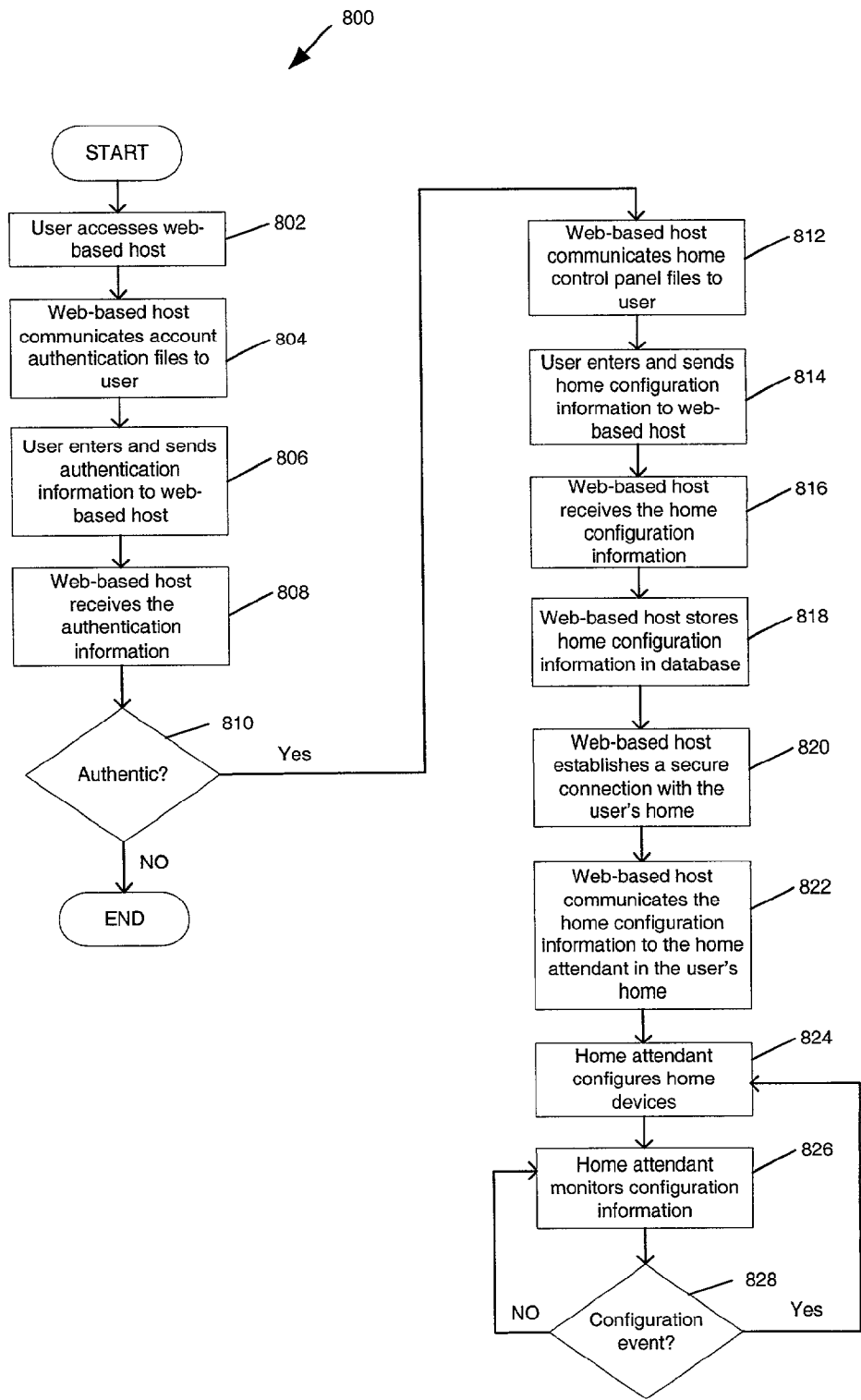


FIG. 9

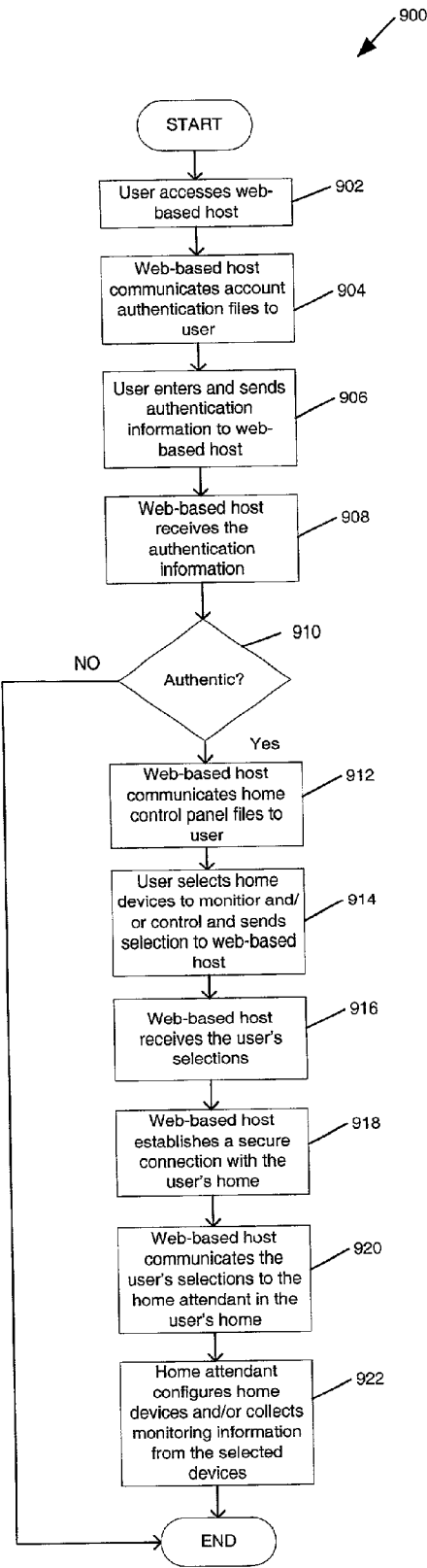


FIG. 10

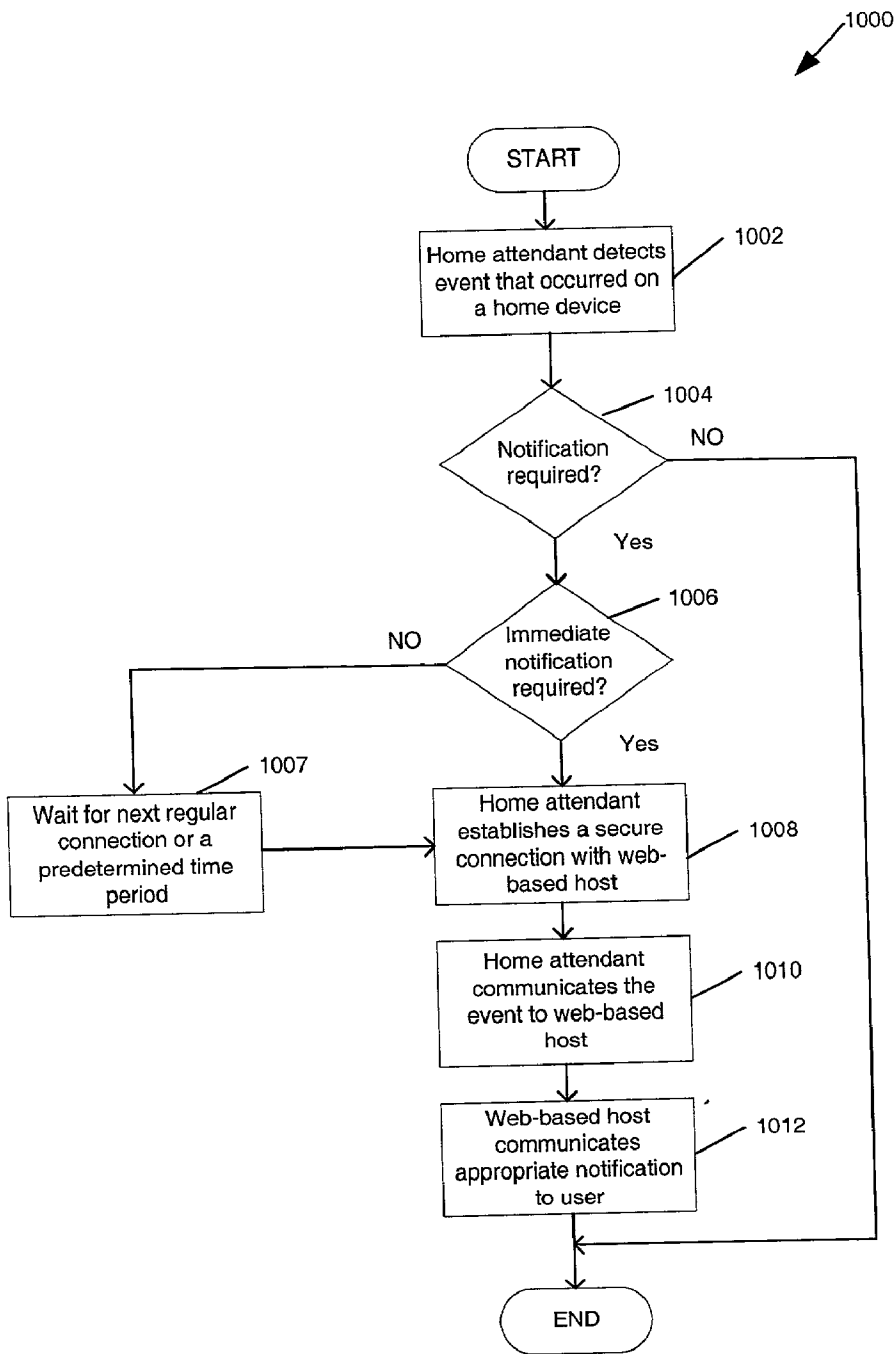
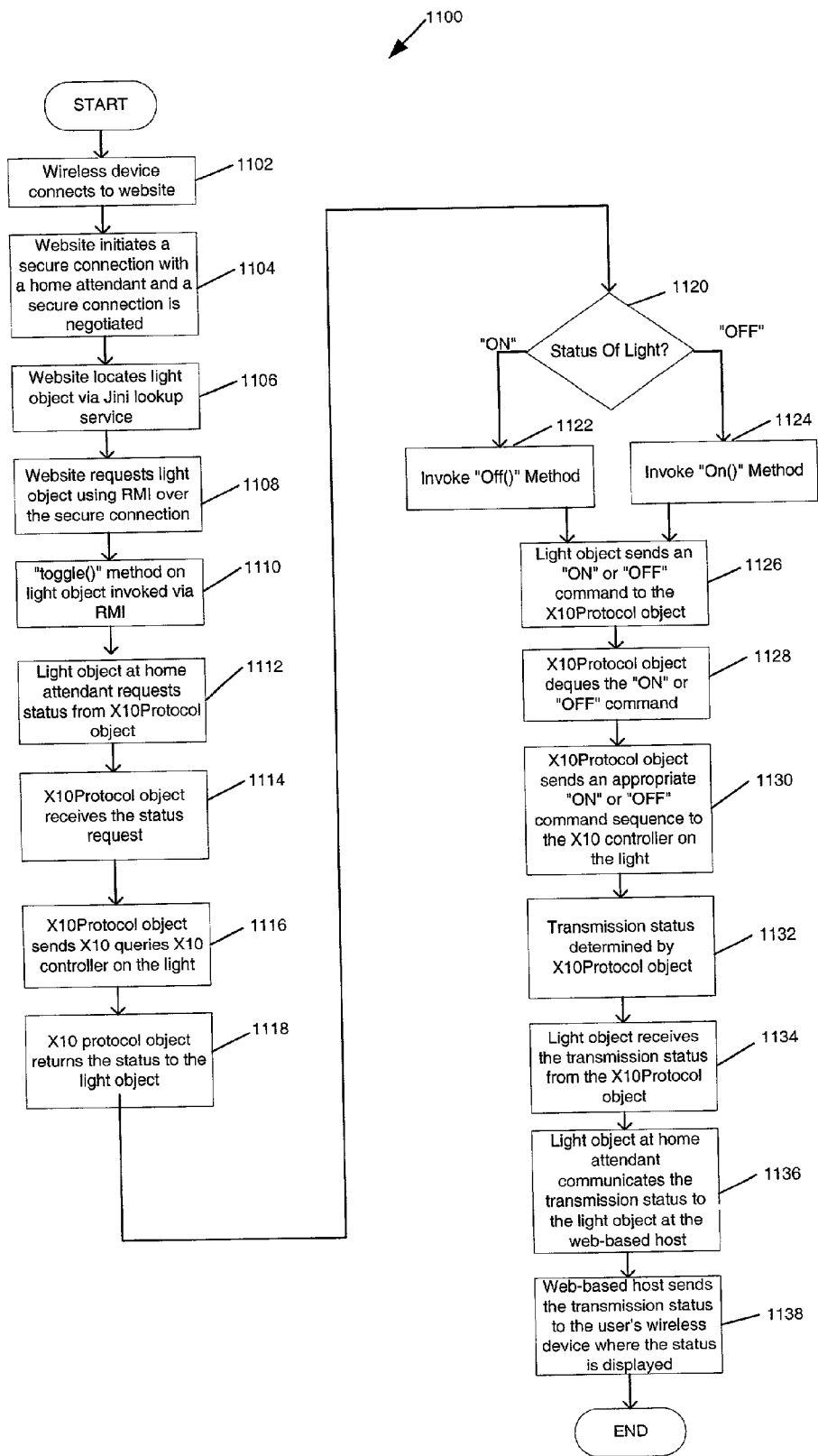


FIG. 11



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WEB-BASED SYSTEM FOR MONITORING AND/OR CONTROLLING HOME DEVICES

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a web-based system for monitoring and/or controlling home devices.

[0003] 2. Related Art

[0004] Systems for monitoring and/or controlling home devices have become increasingly popular in recent years. Such systems are used to control, monitor, manage, diagnose, and otherwise communicate with home devices such as lights, thermostats, or security systems.

[0005] Conventional systems for controlling and/or monitoring home devices are controlled using a home controller located in the home. The home controller is connected to various home devices and is operable to send commands to and receive information from the various home devices. A user can program the home controller to control the home devices according to the user's preferences.

[0006] Some conventional systems for controlling and/or monitoring home devices allow a user to access the home controller from a remote location using a device such as a telephone or a desktop computer. For example, a user can use a touch-tone telephone located in a remote location to connect with the home controller in the user's home. The user can then send commands to the home controller to control various home devices. For example, the user can turn lights on or off via the touch-tone phone.

[0007] Such conventional systems for controlling and/or monitoring home devices have at least the following disadvantages and limitations. First, the connection between the user's remote computer and the home controller is not secure. A user could establish a secure connection, but the cost and complexity involved in establishing such a connection is prohibitive. Second, such systems are complex for users to implement and maintain. For example, the home controller may be difficult to install. Third, programming such systems is cumbersome. Fourth, it is difficult for the user to access the home controller using different types of remote devices. Conventional systems only allow a user to access the home controller using, for example, a desktop computer located in the user's workplace.

[0008] What is needed is a system that overcomes the disadvantages and limitations of conventional systems for controlling and/or monitoring home devices.

SUMMARY OF THE INVENTION

[0009] The present invention overcomes the disadvantages and limitations of conventional systems for controlling and/or monitoring home devices. The present invention accomplishes this by providing a web-based system for controlling and/or monitoring home devices.

[0010] The web-based system includes one or more remote devices, a web-based host, a network, and one or more homes. A user can connect to the web-based host using a remote device via a network such as the Internet. The web-based host provides the user with an interface for monitoring and/or controlling home devices in the user's

home. Via the interface, the user can select one or more home devices in the user's home to monitor and/or control. The web-based host receives the user's selections and communicates the user's selections to the user's home via the network. The user's home then receives the user's selections and causes monitoring information to be obtained from selected home devices and/or causes the behavior of selected home devices to be controlled according to the user's selections. The user's home can then communicate monitoring and/or other information related to the home devices to the web-based host via the network. The web-based host then communicates the monitoring and/or other information related to the home devices to the remote device via the network where the information is displayed.

[0011] Other embodiments, aspects, and advantages of the present invention will become apparent from the following descriptions, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] For a more complete understanding of the present invention and for further embodiments, aspects, and advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, in which:

[0013] **FIG. 1** is a block diagram of an exemplary web-based system for controlling and/or monitoring home devices, according to some embodiments of the present invention.

[0014] **FIGS. 2A and 2B** are block diagrams of exemplary remote devices, according to some embodiments of the present invention.

[0015] **FIG. 3** is a block diagram of an exemplary home, according to some embodiments of the present invention.

[0016] **FIGS. 4A, 4B, 4C, and 4D** are block diagrams of exemplary homes showing different configurations for the home attendants within the homes, according to some embodiments of the present invention.

[0017] **FIGS. 5A and 5B** are block diagrams of exemplary home devices, according to some embodiments of the present invention.

[0018] **FIG. 6** is a block diagram an exemplary web-based host, according to some embodiments of the present invention.

[0019] **FIG. 7** is a flowchart of an exemplary method of generating a user account, according to some embodiments of the present invention.

[0020] **FIG. 8** is a flowchart of an exemplary method for configuring home devices in a user's home, according to some embodiments of the present invention.

[0021] **FIG. 9** is a flowchart of an exemplary method for remotely monitoring and/or controlling home devices in a user's home, according to some embodiments of the present invention.

[0022] **FIG. 10** is a flowchart of an exemplary method for logging and/or notifying a user of an event that has been detected by a home device, according to some embodiments of the present invention.

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[0023] FIG. 11 is a flowchart of an exemplary method for operating a remote device, according to some embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0024] The preferred embodiments of the present invention and their advantages are best understood by referring to FIGS. 1-11 of the drawings. Like reference numerals are used for like and corresponding components of the various drawings. Components labeled with a reference numeral followed by "n" (where n=a, b, c, . . .) indicate a plurality of such components. As used herein, the term "software" refers to one or more computer programs which include computer instructions. Software can be stored on a computer readable storage medium such as any type of memory, a magnetic disk, a CD-ROM, or the like.

[0025] System Architecture

[0026] FIG. 1 is a block diagram of an exemplary web-based system 2 for controlling and/or monitoring home devices, according to some embodiments of the present invention. Web-based system 2 includes a plurality of remote devices 10n, a plurality of homes 30n, a network 50, and a web-based host 70.

[0027] Remote devices 10n are connected to network 50 via respective connections 5n. Connections 5n can be any type of suitable connections that allow data/information to be transferred between remote devices 10n and network 50 such as a wireless gateway connection (e.g., if remote device 10n is a cellular telephone) or a digital subscriber line (DSL) connection (e.g., if remote device 10n is a desktop computer). Connections 5n can be secure connections utilizing any suitable security protocol such as SSL, SHTTP, or any other encryption/cryptography technologies.

[0028] Homes 30n are connected to network 50 via respective connections 6n. Connections 6n can be any type of suitable connections that allow data/information to be transferred between homes 30n and network 50 such as 56 Kbps dial-up modems, cable modems, DSL modems, fiber optic modems, or any combination thereof. Connections 6n can be secure connections utilizing any suitable security protocol such as SSL, SHTTP, or any other encryption/cryptography technologies.

[0029] Web-based host 70 is connected to network 50 via connection 7. Connection 7 can be any type of connection that allows data/information to be transferred between web-based host 70 and network 50. Connection 7 can be a secure connection utilizing any suitable security protocol such as SSL, SHTTP, or any other encryption/cryptography technologies.

[0030] Network 50 can be any type of network such as a global area network (GAN) (e.g., the Internet), a wide area network (WAN), a metropolitan area network (MAN), a local area network (LAN), or any combination thereof.

[0031] Remote Device Architecture

[0032] FIGS. 2A and 2B are block diagrams of exemplary remote devices 10n, according to some embodiments of the present invention. In general, remote devices 10n can be any type of electronic devices which are capable of communicating with web-based host 70 via network 50. For clarity,

connections between the components of exemplary remote devices of FIGS. 2A and 2B are not shown.

[0033] FIG. 2A is a block diagram of an exemplary wireless remote device 10n-1. Remote device 10n-1 includes the following components: a microprocessor 12 capable of executing software 13 stored in memory 14, a display 15 for displaying information to a user, an input keypad 16 for accepting user input, and a transceiver circuit 17 for transmitting data/information to and receiving data/information from network 50 via antenna 18. Remote device 10n-1 can be any type of wireless device such as a cellular telephone, a wireless PDA, or a wireless computer. Software 13 generally includes any suitable operating system and any suitable microbrowser. As shown, connection 5 provides a wireless connection for transmitting data/information between device 10n-1 and network 50.

[0034] FIG. 2B is a block diagram of an exemplary wired remote device 10n-2. Remote device 10n-2 includes the following components: a microprocessor 12 capable of executing software 13 stored in memory 14, a display 15 for displaying information to a user, an input keypad 16 for accepting user input, and a transceiver circuit 17 for transmitting data/information to and receiving data/information from network 50. Remote device 10n-2 can be any type of wired device such as a desktop computer or a wired PDA. Software 13 generally includes any suitable operating system and any suitable browser (e.g., Internet Explorer). As shown, connection 5 provides a wired connection for transmitting data/information between device 10n and network 50.

[0035] It should be understood that remote devices 10n-1 and 10n-2 of FIGS. 2A and 2B are merely examples and that other remote devices 10n may not include all of the components shown and/or may include additional components.

[0036] Home Architecture

[0037] FIG. 3 is a block diagram of an exemplary home 30n, according to some embodiments of the present invention. Home 30n can be any type of residence such as a home, a condominium, or an apartment. Home 30n includes a home attendant 31 and a plurality of home devices 40n.

[0038] Home attendant 31 communicates with web-based host 70 via connection 6 and network 50. In operation, web-based host 70 can communicate data/information to home attendant 31. Home attendant 31 can then use the communicated data/information to control the behavior of home devices 10n and/or collect data/information from home devices 40n. Home attendant 31 can then communicate the collected data/information to web-based host 70. Web-based host 70 can log the collected data/information in a database and/or communicate the data/information to a user's remote device 10n.

[0039] Home attendant 31 can also monitor home devices 40n. Upon the occurrence of an event on a home device 40n, home attendant 31 can communicate that the event has occurred to web-based host 70. The event can be communicated to web-based host 70 immediately or at a later time. Web-based host 70 can then log the event in a database and/or communicate the data/information to a user's remote device 10n. Web-based host 70 can then communicate the event to a user immediately or at a later time.

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[0040] Connections 39n can be any type of connections which allow data/information to be transferred between home attendant 31 and home devices 40n. For example, connections 39n can be powerline connections such as X10, CeBus, or LonWorks connections, wireless connections such as Bluetooth connections or other radio frequency (RF) connections, or any combination thereof.

[0041] FIGS. 4A, 4B, 4C, and 4D are block diagrams of exemplary homes 30n-1, 30n-2, 30n-3, and 30n-4, respectively, showing different configurations for the home attendants 31, according to some embodiments of the present invention. For clarity, not all of the connections between the components within the exemplary home attendants 31 of FIGS. 4A, 4B, 4C, and 4D are shown.

[0042] In FIG. 4A, home attendant 31-1 of home 30n-1 is configured as a stand-alone device which communicates with network 50 via a dial-up modem (not shown). Home attendant 31-1 includes a microprocessor 32 capable of executing software 33 stored in memory 34, and an interface circuit 35 used to communicate with home devices 40n and network 50. Software 33 includes home attendant programs 36 (discussed below). Interface circuit 35 includes a dial-up modem that is connected to connection 6. The dial-up modem (not shown) allows home attendant 31-1 to communicate with web-based host 70 via network 50.

[0043] In FIG. 4B, home attendant 31-2 of home 30n-2 is configured as a stand-alone device connected to a home network N1. Home attendant 31-2 includes a microprocessor 32 capable of executing software 33 stored in memory 34, and an interface circuit 35 used to communicate with home devices 40n and network N1. Software 33 includes home attendant programs 36 (discussed below). Interface circuit 35 includes a network card (not shown) that allows home attendant 31-2 to communicate with personal computers PC1 and PC2 and modem M1. Modem M1 can be any type of modem such as a DSL or cable modem that provides an interface to network 50 via connection 6. Although not shown, home devices 40n can also be connected to home network N1.

[0044] In FIG. 4C, home attendant 31-3 of home 30n-3 is configured as a peripheral of a personal computer PC3. Home attendant 31-3 includes a microprocessor 32 capable of executing software 33 stored in memory 34, and an interface circuit 35 used to communicate with home devices 40n and personal computer PC3. Software 33 includes home attendant programs 36 (discussed below). Home attendant 31-3 and personal computer PC3 can be connected via any standard personal computer interface such as a USB connection. Personal computer PC3 generally includes a modem (not shown) for interfacing with network 50 via connection 6.

[0045] In FIG. 4D, home attendant 31-4 of home 30n-4 is configured as a set-top box for a television TV1. Home attendant 31-4 includes a microprocessor 32 capable of executing software 33 stored in memory 34, and an interface circuit 35 for communicating with home devices 40n and television TV1. Software 33 includes home attendant programs 36 (discussed below). Interface circuit 35 includes a cable modem (not shown) that is connected to connection 6. The cable modem allows home attendant 31-4 to communicate with web-based host 70 via network 50.

[0046] Home attendant programs 36 include at least the following programs/applications: an application that enables

communication between home attendant 31 and home devices 40n; an application that enables communication between home attendant 31 and web-based host 70 via network 50; an application that interprets home configuration information (discussed below) communicated to home attendant 31 from web-based host; an application that sends appropriate commands to home devices 40n such that they operate according to the home configuration information; an application that monitors the home configuration information and changes the configuration of home devices 40n according to the home configuration information; and an application that causes home devices 40n to be monitored and/or controlled in response to actions initiated by a user of a remote device 10n.

[0047] Home attendant programs 36 can also include Java™ and Jini™ programs/applications which allow home attendant 31 to operate as a “peripheral” device of web-based host 70. In such cases, each home device 40n can be represented by a respective object (e.g., a front porch light object for the front porch light, or a thermostat object for the thermostat, a security system object for the security system) stored on home attendant 31. Web-based host 70 can then use Java™ Remote Method Invocation (RMI) techniques to access and invoke methods associated with the objects stored on home attendant 31. This approach reduces the cost and complexity of home attendant 31, allowing resource intensive operations such as configuration, user interface management, and data logging to be managed and performed by servers 71 at web-based host 70 (FIG. 6).

[0048] It should be understood that home attendants 31-1, 31-2, 31-3, and 31-4 are merely examples and that various modification of home attendants are within the scope of the present invention. For example, home attendants 31 can include other features such as a displays and input keypads that allow a user to directly access home attendant 31 and to generate and/or modify configuration information and/or control and/or monitor home devices 40n. As another example, the functionality of home attendant 31 can be incorporated into one or more of the home devices 40n eliminating the need for a separate home attendant 31.

[0049] Home Device Architecture

[0050] FIGS. 5A and 5B are block diagrams of exemplary home devices 40n, according to some embodiments of the present invention. As used herein, the term “home devices” broadly refers to any type of device located in a home that can communicate with home attendant 31 such as home appliances, electrical devices such as lights, home sensors, home security systems, video cameras, audio devices, remote controls for entertainment devices and the like, touch screens, thermostats, high power devices such as pool pumps, outdoor power modules and other like systems and devices located in a home, apartment, condominium, or the like. For clarity, not all of the connections between the components within the exemplary home devices of FIGS. 5A and 5B are shown.

[0051] FIG. 5A is a block diagram of an exemplary home device 40n-1, according to some embodiments of the present invention. Home device 40n-1 is a relatively complex home device such as a smart appliance. Home device 40n-1 includes a microprocessor 42 capable of executing software 43 stored in memory 44, control circuitry 45, and an interface circuit 46 for communicating with home attendant

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31 via connection **39n**. Operating together, microprocessor **42**, software **43**, and control circuitry **45** can process commands received by home attendant **31** thereby changing the behavior of home device **40n-1** or providing home device status information to home attendant **31**.

[0052] **FIG. 5B** is a block diagram of an exemplary home device **40n-2**, according to some embodiments of the present invention. Home device **40n-2** is a relatively simple home device such as a light switch. Home device **40n-2** includes control circuitry **45** and an interface circuit **46** for communicating with home attendant **31** via connection **39n**. Control circuitry **45** can process commands received by home attendant **31** thereby changing the behavior of home device **40n-1** or providing home device status information to home attendant **31**.

[0053] It should be understood that home devices **40n-1** and **40n-2** are merely examples and that various modifications of home devices are within the scope of the present invention.

[0054] Web-Based Host Architecture

[0055] **FIG. 6A** is a block diagram an exemplary web-based host **70**, according to some embodiments of the present invention. Web-based host **70** can be operated by various entities such as an application solution provider (ASP), an Internet service provider (ISP), or a portal such as Yahoo, Excite, or AOL.

[0056] Web-based host **70** includes a server **71** having a microprocessor **72** which is capable of executing software **73** stored in memory **74**, and a database **75** connected to server **71**. Software **73** includes control panel programs **76** (discussed below). Control panel programs **76** includes a suite of programs/applications that perform a wide variety of functions related to the present invention. Server **71** can include a plurality of physical computers (e.g., a server farm or cluster), and software **73** may run on one or more of the plurality of physical server computers. Server **71** can be a desktop computer, a mainframe, a file server, a workstation, or any other suitable data processing facility. Server **71** can operate under the control of any suitable operating system such as MS-DOS, MacINTOSH OS, Windows NT, Windows 98, Windows 2000, OS/2, AIX, OS/390, OS/400, VMS, Unix, Linux, Solaris, and the like.

[0057] Control panel programs **76** can include at least the following applications: an application that enables secure communication between web-based host **70** and remote devices **10n** via network **50**; an application that enables secure communications between web-based host **70** and homes **30n** via network **30** (e.g., an SSL application, an encryption application, etc.); an application that, at the time a secure connection is established between web-based host **70** and a remote device **10n**, detects the type of remote device **10n** that the user is using so that web-based host **70** can communicate appropriate graphical file formats to remote device **10n** (e.g., communicating RTML files if remote device **10n** is a personal computer or communications WML files if remote device **10n** is a cellular telephone); an application that communicates appropriate graphical interface files having fields to remote devices **10n** operated by users such that the user can enter account information, home configuration information, authentication information, home device monitoring and/or control infor-

mation, and the like; an application that allows web-based host **70** to access and invoke methods on remote objects (e.g., a Java™/Jini™/Java™ RMI based application); an application for querying and otherwise accessing database **75** (e.g., an SQL database interface, an JDBC database interface, etc.); and an application for sending alerts and messages to remote devices **10n** (e.g., WAP alerts, SMS messages, or SNPP paging).

[0058] System Operation

[0059] **FIGS. 7 through 10** describe methods that can be performed on web-based system **2**, according to some embodiments of the present invention. Skilled artisans will recognize that the methods described with reference to **FIGS. 7-10** can be implemented using a variety of software technologies/architectures. For example, the methods described with reference to **FIGS. 7-10** can be implemented using a distributed object architecture based on Java™ and Jini™ technologies, and in particular, using Java™ RMI technologies. Java™ RMI is a distributed object system that allows a client machine to reference an object running on a server machine and invoke methods on an object stored on the server machine as if the object were a local object running on the client machine. A description of Java™ RMI can be found in "Java Enterprise In A Nutshell," (1999), by David Flanagan, Jim Farley, William Crawford & Kris Magnusson, which is incorporated herein by reference in its entirety. A description of Jini™ can be found in "Professional Jini," (2000) by Sing Li and at <http://www.sun.com/jini>, which are herein incorporated by reference in their entireties.

[0060] Skilled artisans will also recognize that other software technologies/architectures can be used to implement the methods of present invention, all of which are within the scope of the present invention. Such techniques can include using other techniques for communicating between distributed objects in addition to Java™ RMI such as Common Object Request Broker Architecture (CORBA) or Distributed Component Object Model (DCOM). Such techniques can also include basic socket programming techniques, where a "raw" communication channel is used to pass messages and data between two remote processes (e.g., the website and the home controller).

[0061] Account Generation

[0062] **FIG. 7** is a flowchart of an exemplary method **700** of generating a user account with web-based host **70**, according to some embodiments of the present invention. Once a user has established an account with web-based host **70**, the user can monitor and/or control home devices **40n** in the user's home **30n** via a remote device **10n**.

[0063] In step **702**, the user accesses web-based host **70**. The user can, for example, access web-based host **70** using a remote device **10n** running a web browser. In step **704**, the control panel programs **76** running on web-based host **70** communicate one or more graphical files (e.g., webpages) to the user. The graphical files include fields that allow the user to enter account information such as the user's home address, telephone number, payment information such as a credit card number, and other like information. In step **706**, the user enters and sends the account information to web-based host **70**. In step **708**, the control panel programs **76** running on web-based host **70** receive the account informa-

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tion. In step 710, the control panel programs 76 generate an account and store the account in database 75.

[0064] Home Device Configuration

[0065] FIG. 8 is a flowchart of an exemplary method 800 for configuring home devices 40n in a user's home 30n, according to some embodiments of the present invention. Method 800 can be performed at the time a user generates an account (e.g., via method 700) and any time thereafter.

[0066] In step 802, the user accesses web-based host 70. The user can, for example, connect to web-based host 70 using a remote device 10n running a browser. In step 804, the control panel programs 76 running on web-based host 70 communicate one or more account authentication files (e.g., webpages) to the user. The account authentication files include fields that allow the user to enter authentication information such as a username and a password. In step 806, the user enters and sends the authentication information to web-based host 70. In step 808, the control panel programs 76 running on web-based host 70 receive the authentication information. In step 810, the control panel programs 76 query database 75 to authenticate the user. If the user is not properly authenticated, the method 800 ends and the user can reattempt to log in by returning to step 806. If the user is properly authenticated, method 800 proceeds to step 812.

[0067] In step 812, the control panel programs 76 running on web-based host 70 communicate one or more home control panel files (e.g., webpages) to the user. The home control panel files include fields that allow the user to enter home configuration information.

[0068] The home configuration information provided by the user allows the user to generate a customized description of their home. For example, the user can enter a description of each home device in the user's home, the unique address of each home device. The home configuration information also includes behavior information or "behavioral settings" for each device. The behavioral settings for each device can include instructions for the dates and times to turn the device on and off. The behavioral settings can also instruct the home attendant to monitor the status of home devices and to change the behavior or state of the home devices according to a user's preferences (e.g., a daytime state, an evening state, and a nighttime state for each device). The behavioral settings can also include more complex instructions such as requesting the user to be notified on their pager if the front door is opened from 9:00 AM to 5:00 PM.

[0069] If web-based system 2 is implemented using a distributed object architecture, the home configuration information can be used to generate objects corresponding to one or more of the home devices 40n in a user's home 30n. The objects can be stored on the home attendant 31 in a user's home 30n. The objects can then be accessed by web-based host 70 (e.g., via Java™ RMI) such that the behavior of the home device 40n associated with the object can be monitored, controlled, managed, diagnosed, or the like.

[0070] In step 814, the user enters and sends the home configuration information to web-based host 70. In step 816, the control panel programs 76 running on web-based host 70 receive the home configuration information. In step 818, the control panel programs 76 store the home configuration information in database 75. The home configuration information can be stored in any suitable format such as a script file.

[0071] In step 820, the control panel programs 76 establish a secure connection with the user's home 30n and, in particular, with home attendant 31 in the user's home 30n. In step 822, the control panel programs 76 communicate the home configuration information to home attendant 31 in the user's home 30n. If the home configuration information is in the form of a script file, the script file can be translated before it is communicated to home attendant 31, or home attendant 31 can translate the script file.

[0072] In step 824, home attendant 31 configures the home devices 40n according to the home configuration information. At this time, the home devices 40n are configured according to the user's initial specified behavioral settings. For example, if the behavioral settings indicate that the front porch light should be "ON" from 6:30 PM to 10:00 PM, and the current time is 7:00 PM, home controller will send an appropriate command turning the front porch light "ON." Home attendant 31 generally stores the home configuration information in memory 34 at this time.

[0073] In step 826, home attendant 31 continuously monitors the home configuration information to configure the home devices 40n according to scheduled changes the home configuration information. If a configuration change is scheduled to occur (step 828), method 800 proceeds to step 824 where home attendant 31 configures the appropriate home devices 40n accordingly. If a configuration change is not scheduled to occur (step 828), method 800 proceeds to step 826 where home attendant 31 continues to monitor the home configuration information for scheduled configuration changes. For example, if the home configuration information includes a front porch light schedule which indicates that the front porch light is scheduled to be "ON" from 6:30 PM to 10:00 PM, and the current time is 6:30 PM, home attendant 31 sends an appropriate command to the front porch light turning it "ON" at 6:30 PM. Home attendant 31 then continues to monitor the front porch light schedule and, when the time is 10:00 PM, home attendant 31 sends an appropriate command to the front porch light turning it "OFF" at 10:00 PM.

[0074] Remote Monitoring and/or Control of Home Devices

[0075] FIG. 9 is a flowchart of an exemplary method 900 for remotely monitoring and/or controlling home devices 40n in a user's home, according to some embodiments of the present invention.

[0076] In step 902, a user accesses web-based host 70. The user can, for example, connect to web-based host 70 using a remote device 10n running a web browser. In step 904, the control panel programs 76 running on web-based host 70 communicate one or more account authentication files (e.g., webpages) to the user. The account authentication files include fields that allow the user to enter authentication information such as a username and a password. In step 906, the user enters and sends the authentication information to the web-based host. In step 908, the control panel programs 76 running on web-based host 70 receive the authentication information. In step 910, the control panel programs 76 query database 75 to authenticate the user. If the user is not properly authenticated, the method 900 ends and the user can reattempt to log in (step 906). If the user is properly authenticated, method 900 proceeds to step 912.

[0077] In step 912, the control panel programs 76 running on web-based host 70 communicate one or more control

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panel files (e.g., webpages) to the user. The home control panel files include fields that allow the user to monitor and/or control home devices **40n** in the user's home **30n**.

[0078] In step **914**, the user selects one or more home devices **40n** to monitor and/or control and the user's selections are sent to web-based host **70**. In step **916**, the control panel programs **76** running on web-based host **70** receive the user's selections.

[0079] In step **918**, the control panel programs **76** establish a secure connection with the user's home **30n** and, in particular, with home attendant **31** in the user's home **30n**. In step **920**, the control panel programs **76** communicate the user's selections to home attendant **31**.

[0080] In step **922**, home attendant **31** configures the selected home devices **40n** pursuant to the user's selection and/or collects monitoring information from the selected home devices **40n**. For example, if the user's selection requested the thermostat to be turned to 70 degrees immediately, home attendant **31** sends an appropriate command to the thermostat causing it to be turned to 70 degrees. As another example, if the user's selection requested the current temperature of the thermostat to be obtained, home attendant **31** sends an appropriate command to the thermostat causing the thermostat's current temperature to be read. Home attendant **31** can then communicate this information back to the control panel programs. The control panel programs can then communicate this to the user's remote device **10n** where the information is displayed.

[0081] Home Event Logging and/or Notification

[0082] FIG. 10 is a flowchart of an exemplary method **1000** for logging and/or notifying a user of an event that has been detected by a home device **30n**, according to some embodiments of the present invention. Method **1000** can be used, for example, to alert a user of an intrusion into the user's home **30n**.

[0083] In step **1002**, home attendant **31** detects an event which has occurred on a home device **40n**. In step **1004**, home attendant **31** determines whether this event requires notification. Home attendant **31** can make this determination by accessing event notification information in the home configuration files (discussed above). If the event does not require notification, method **1000** ends. If the event requires notification, method **1000** proceeds to step **1006**.

[0084] In step **1006**, home attendant **31** determines whether the event requires immediate notification (e.g., if the home security system detects a breach of security). Home attendant **31** can determine the urgency of the notification from the notification information in the home configuration files. If the event requires immediate notification, method **1000** immediately proceeds to step **1008** where the home attendant **31** establishes a connection with web-based host **70** and communicates the event to web-based host **70**. If the event does not require immediate notification, method **1000** proceeds to **1007** where home attendant **31** stores a record of the event in its memory **34** and waits until the next time a connection is established between web-based host **70** and home attendant **31** to communicate the event to web-based host **10**.

[0085] In step **1010**, home attendant **31** communicates the event to the control panel programs **76** running on web-

based host **70**. In step **1012**, web-based host logs the event in its database and/or sends an appropriate notification to the user. The notification can be sent to one or more remote devices **10n** possessed by the user or any other electronic notification device such as a pager. Web-based host **70** can also access information provided by the user (and stored in the database) which indicates how and when to communicate the event to the user (e.g., immediately report the event via a pager message or email message).

Example

Remote Control of a Home Device Using Java™ and Jini™ Technologies

[0086] FIGS. 7-10 have described in general an exemplary account generation method (method **700**), an exemplary home device configuration method (method **800**), an exemplary remote monitoring and/or control method (method **900**), and an exemplary home event logging and/or notification method (method **1000**), all of which can be performed on web-based system **2** (FIG. 1). As mentioned above, such methods can be implemented using a wide variety of software technologies/architectures. For example, objects associated with each home device **40n** can be stored on home attendant **31**. Each of these objects can be located by web-based host **70** using the Jini™ lookup service and controlled and/or monitored by using methods similar to method **1100**.

[0087] FIG. 11 is intended to show an example of how Java™ and Jini™ technologies can be used to remotely control a home device **40n**. In particular, method **1100** describes how a user can use a remote device **10n** to toggle (e.g., turn the light off if the light is currently on, or turn the light on if the light is currently off) a home device **40n** which is a light in the user's home **30n**. Method **1100** assumes that a "light object" and a "X10Protocol object" exist on home attendant **31**. The light object includes a "toggle()" method for communicating with the X10Protocol object, an "On()" or "Off()" method for turning the light in the user's home **30n** on or off, and a "status()" method that returns the current status of the light (i.e., "ON," "OFF," or "Unknown").

[0088] In step **1102**, a user connects to a website **70** using a remote device **10**. Via a browser, the user logs into their account, which is stored in database **75** of website **70**, and requests a light to be turned on in the user's home **30**. The website then receives the user's request and method **1102** proceeds to step **1104**.

[0089] In step **1104**, the website initiates a secure socket layer (SSL) connection with the home attendant **31** in the user's home. The SSL connection is then fully negotiated. In step **1106**, the website locates the user selected light object using the Jini™ lookup service. In step **1108**, the website requests the light object using RMI over the SSL connection and obtains a shadow copy of the light object. In step **1110** the "toggle()" method on the light object is invoked via RMI.

[0090] In step **1112**, the light object at home attendant **31** invokes the "status()" method which requests status from the X10Protocol object. In step **1114**, the X10Protocol object at the home attendant **31** retrieves the status request from the light object. In step **1116**, the X10Protocol object queries the

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X10 controller on the light to determine whether the light is "ON" or "OFF." In step 1118, the X10Protocol object returns the status to the light object (i.e., via the "status()" method) which was obtained from the X10 controller. In step 1120, the light object invokes either the "On()" or "Off()" method on the light object depending on the status of the light. If the status of the light is on, then the "Off()" method is invoked (step 1122). If the status of the light is off, then the "On()" method is invoked (step 1124).

[0091] In step 1126, the light object sends an "ON" or "OFF" command to the X10Protocol object. In step 1128, the X10Protocol object dequeues the "ON" or "OFF" command. In step 1130, the X10 Protocol object send an appropriate "ON" or "OFF" X10 command sequence to the X10 controller on the light.

[0092] In step 1132, the X10 controller returns the transmission status (e.g., whether the X10 command sequence was successfully or unsuccessfully transmitted) to the X10Protocol object. In step 1134, the light object receives the transmission status from the X10Protocol object. In step 1136, the light object at the home attendant 31 sends the transmission status to the light object at the website. The transmission status is sent to the light object at the website using RMI over the SSL connection.

[0093] In step 1138, the website sends the transmission status to the user's remote device 10n. The user's remote device then displays the transmission status via the browser running on the user's remote device.

[0094] Advantages of the Present Invention

[0095] From the above description, it should be apparent that the present invention provides at least the following advantages. First, user's can monitor and/or control home devices in their home from virtually anywhere in the world using cellular telephones, wireless PDA's, desktop computers, or any other electronic devices which can connect to a network such as the internet. Second, if a distributed object architecture is used, resource intensive functions can be performed by computers at the web-based host. As a result, the home attendant's complexity can be minimized and thus the cost of the home attendant can be reduced. Third, the web-based system can use existing encryption and protocol technologies to ensure that the communication of data/information on the web-based system is secure. Thus, intruders and hackers will not be able to access home attendants and thereby gain unauthorized control of the home devices in a user's home.

[0096] While particular embodiments of the present invention and their advantages have been shown and described, it should be understood that various changes, substitutions, and alterations can be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. A method for remotely monitoring and/or controlling a home device performed on a web-based host, the method comprising:

- establishing a connection with a remote device;
- receiving monitoring and/or control information from the remote device;

establishing a connection with a home; and

communicating the monitoring and/or control information to the home, wherein the monitoring and/or control information causes monitoring information to be obtained from a home device in the home and/or causes the a home device in the home to be controlled.

2. The method of claim 1 further comprising:

receiving authentication information from the remote device; and

determining at the web-based host whether a user of the remote device has permission to access the home.

3. The method of claim 1 further comprising:

communicating graphical interface files to the remote device, the graphical interface files for allowing a user of the remote device to select a home device to monitor and/or control and for allowing the user of the remote device to specify how to monitor and/or control the home device.

4. The method of claim 1 further comprising:

encrypting the monitoring and/or control information before the monitoring and/or control information is communicated to the home.

5. The method of claim 1 further comprising:

receiving home device status information in response to the step of communicating the monitoring and/or control information from the web-based host to the home; and

communicating the home device status information to the remote device.

6. The method of claim 1 further comprising:

establishing a connection with the home if a home device in the home has detected an event;

receiving information which describes the event; and

communicating the information which describes the event to a user.

7. The method of claim 1 wherein the remote device is a wireless telephone, a wireless personal digital assistant, or a wireless computer.

8. The method of claim 1 wherein the remote device is a wired telephone, a wired personal digital assistant, or a wired computer.

9. A computer system for remotely monitoring and/or controlling a home device, the computer system comprising:

one or more computers connected to one or more remote devices via a network;

one or more computer programs executable by the computers, wherein the computer programs comprise computer instructions for:

establishing a connection with a remote device;

receiving monitoring and/or control information from the remote device;

establishing a connection with a home; and

communicating the monitoring and/or control information to the home, wherein the monitoring and/or control information causes monitoring information

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to be obtained from a home device in the home and/or causes the a home device in the home to be controlled.

10. The computer system of claim 9 wherein the computer programs further comprise computer instructions for:

receiving authentication information from the remote device; and

determining at the web-based host whether a user of the remote device has permission to access the home.

11. The computer system of claim 9 wherein the computer programs further comprise computer instructions for:

communicating graphical interface files to the remote device, the graphical interface files for allowing a user of the remote device to select a home device to monitor and/or control and for allowing the user of the remote device to specify how to monitor and/or control the home device.

12. The computer system of claim 9 wherein the computer programs further comprise computer instructions for:

encrypting the monitoring and/or control information before the monitoring and/or control information is communicated to the home.

13. The computer system of claim 9 wherein the computer programs further comprise computer instructions for:

receiving home device status information in response to the step of communicating the monitoring and/or control information from the web-based host to the home; and

communicating the home device status information to the remote device.

14. The computer system of claim 9 wherein the computer programs further comprise computer instructions for:

establishing a connection with the home if a home device in the home has detected an event;

receiving information which describes the event; and

communicating the information which describes the event to a user.

15. The computer system of claim 9 wherein the remote device is a wireless telephone, a wireless personal digital assistant, or a wireless computer.

16. The computer system of claim 9 wherein the remote device is a wired telephone, a wired personal digital assistant, or a wired computer.

17. A computer readable storage medium storing one or more computer programs executable by one or more computers, one or more of the computer programs comprising computer instructions for:

establishing a connection with a remote device;

receiving monitoring and/or control information from the remote device;

establishing a connection with a home; and

communicating the monitoring and/or control information to the home, wherein the monitoring and/or control information causes monitoring information to be obtained from a home device in the home and/or causes the a home device in the home to be controlled.

18. The computer readable storage medium of claim 17 wherein the computer programs further comprise computer instructions for:

receiving authentication information from the remote device; and

determining at the web-based host whether a user of the remote device has permission to access the home.

19. The computer readable storage medium of claim 17 wherein the computer programs further comprise computer instructions for:

communicating graphical interface files to the remote device, the graphical interface files for allowing a user of the remote device to select a home device to monitor and/or control and for allowing the user of the remote device to specify how to monitor and/or control the home device.

20. The computer readable storage medium of claim 17 wherein the computer programs further comprise computer instructions for:

encrypting the monitoring and/or control information before the monitoring and/or control information is communicated to the home.

21. The computer readable storage medium of claim 17 wherein the computer programs further comprise computer instructions for:

receiving home device status information in response to the step of communicating the monitoring and/or control information from the web-based host to the home; and

communicating the home device status information to the remote device.

22. The computer readable storage medium of claim 17 wherein the computer programs further comprise computer instructions for:

establishing a connection with the home if a home device in the home has detected an event;

receiving information which describes the event; and

communicating the information which describes the event to a user.

23. The computer readable storage medium of claim 17 wherein the remote device is a wireless telephone, a wireless personal digital assistant, or a wireless computer.

24. The computer readable storage medium of claim 17 wherein the remote device is a wired telephone, a wired personal digital assistant, or a wired computer.

25. A method for monitoring and/or controlling a home device performed on a home attendant, the method comprising:

establishing a connection with a web-based host; and

receiving monitoring and/or control information from the web-based host.

26. The method of claim 25 further comprising:

communicating the monitoring and/or control information to a home device thereby causing monitoring information to be obtained from the home device and/or causing the home device to be controlled.

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27. The method of claim 25 further comprising:
communicating with a home device to determine whether the home device has detected an event; and
if an event has been detected by the home device, establishing a secure connection with the web-based host and communicating the event to the web-based host.

28. The method of claim 25 further comprising:
communicating with a home device via a radio frequency connection.

29. The method of claim 25 further comprising:
communicating with a home device via a powerline connection.

30. The method of claim 25 wherein the home device is a stand-alone device, a peripheral device, a personal computer, or a television set-top box.

31. An apparatus for monitoring and/or controlling a home device, the apparatus comprising:
a microprocessor;
a memory connected to the microprocessor; and
one or more computer programs executable by the microprocessor, wherein the computer programs comprise computer instructions for:
establishing a connection with a web-based host; and
receiving monitoring and/or control information from the web-based host.

32. The apparatus of claim 31 further comprising:
communicating the monitoring and/or control information to a home device thereby causing monitoring information to be obtained from the home device and/or causing the home device to be controlled.

33. The apparatus of claim 31 further comprising:
communicating with a home device to determine whether the home device has detected an event; and
if an event has been detected by the home device, establishing a secure connection with the web-based host and communicating the event to the web-based host.

34. The apparatus of claim 31 further comprising:
communicating with a home device via a radio frequency connection.

35. The apparatus of claim 31 further comprising:
communicating with a home device via a powerline connection.

36. The apparatus of claim 31 wherein the home device is a stand-alone device, a peripheral device, a personal computer, or a television set-top box.

37. A computer readable storage medium storing one or more computer programs executable by one or more computers, one or more of the computer programs comprising computer instructions for:
establishing a connection with a web-based host; and
receiving monitoring and/or control information from the web-based host.

38. The computer readable storage medium of claim 37 wherein the computer programs further comprise computer instructions for:
communicating the monitoring and/or control information to a home device thereby causing monitoring information to be obtained from the home device and/or causing the home device to be controlled.

39. The computer readable storage medium of claim 37 wherein the computer programs further comprise computer instructions for:
communicating with a home device to determine whether the home device has detected an event; and
if an event has been detected by the home device, establishing a secure connection with the web-based host and communicating the event to the web-based host.

40. The computer readable storage medium of claim 37 wherein the computer programs further comprise computer instructions for:
communicating with a home device via a radio frequency connection.

41. The computer readable storage medium of claim 37 wherein the computer programs further comprise computer instructions for:
communicating with a home device via a powerline connection.

42. The computer readable storage medium of claim 37 wherein the home device is a stand-alone device, a peripheral device, a personal computer, or a television set-top box.

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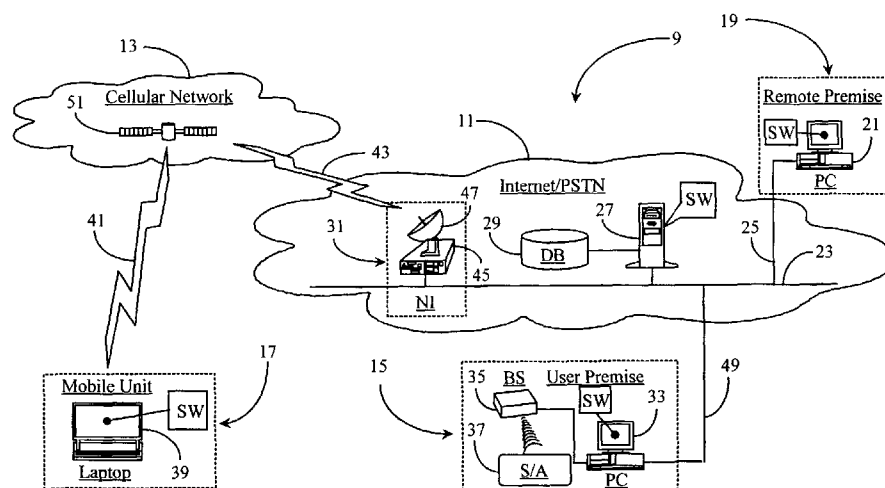
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(54) Title: A HOME AND VEHICULAR AUTOMATION AND CONTROL-DRIVEN WEB PORTAL



(57) **Abstract:** An Internet (11) subscription service provides remote controllability to a subscriber for systems and appliances at the subscriber's home or business. Control units (37) built into or connected to each system and appliance to be controlled have each a microcontroller, system memory, I/O and wiring interface to the systems and appliances, and an RF section for communication with a base station at the home or business. The base station (BS, 35) is Internet-access capable and has an RF section to communicate with the control units. A subscriber can monitor and control the home or business systems and appliances from any Internet-capable device in any location. Functions entered in a web page interface by a subscriber are sent to the appropriate base station and thence to the appropriate control unit. In a further embodiment a subscriber can create a virtual system, then purchase parts through the service and rely on the service to provide installation and debugging aid, after which the newly-installed system may be accessed through the Internet.



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A Home and Vehicular Automation and Control-Driven Web Portal

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Field of the Invention

10 The present invention is in the field of creating and maintaining successful Internet and World Wide Web-based portals and pertains more particularly to methods of driving web-based consumer traffic to such a portal by providing a web-based service for, researching, evaluating, purchasing, monitoring and controlling a plurality of electronic home and vehicle based automation systems and appliances from either
15 local or remote locations via the World Wide Web. Such a web-site providing a single internet location (URL) and uniform and standard interface for programming and controlling such a plurality of systems, irrespective of such systems' and appliances' manufacturers or standards upon which they are based.

20

Background of the Invention

 The field of creating successful and sustainable web-portals has become exponentially more competitive and difficult by each passing month as thousands of
25 new web-based business ideas are launched each week. Truly useful services and ideas are becoming increasingly difficult to find and, furthermore, to sustain in such a competitive environment. Typically such portals include search engines, travel services, lifestyle content providers, news services, retailers, and the like whose business revolves around a pure software and service model. Very few of these
30 commercial web-sites involve hardware, and none are designed to standardize the deployment and control of every single piece of home or vehicle-based automation and

sensor hardware now in existence or that will be coming into existence produced by any manufacturer and based upon any standard.

There are only very few web sites that allow a consumer to control a very limited number of home automation devices, and such web-sites, which are not built
5 entirely from scratch by those few capable consumers who are skilled enough in the art to do so on their own, simply exist in order to assist in the sales of their specific and proprietary home automation devices.

The present invention provides a way for consumers to extend the functionality of new and existing home automation devices and systems, and provides a common
10 look and feel to all these such disparate devices and systems, allowing consumers with very little skill in the art to easily compare, choose, purchase and control such automation devices with a single and very accessible user experience.

In embodiments of the new invention, once a user learns how to program a home watering system using the web site's interface, that same user will be able to
15 program a VCR in almost exactly the same syntax and fashion. The web site provided in the preferred embodiment of the new invention employs a natural-language programming interface that is driven by limited and non-confusing selections from drop down menus that will reconfigure themselves based upon the user's previous drop down menu selections. Other features to the preferred embodiment of this web site
20 include a Virtual Device Applications Builder, which allows the user to input his desired home automation goals, and will then allow him to manipulate, test and view the resulting system in exactly the same way he would a real system. Once the user is satisfied with the virtual configuration of his devices, the web-site provides a laundry list of specific hardware choices, from any and all available devices and manufacturers,
25 and allows the user to purchase this list of items on-line. Moreover, once purchased, the web instructs the user in the configuration and installation of the devices, and ultimately allows the user to control this system via the Internet on this preferred embodiment of the web site. This web site additionally offers objective third-party editorial content evaluating the strengths and weaknesses of competing devices and

standards that the users of the site could use in making their selection of systems and hardware.

The opportunity for this invention arise from a combination of the rapid rise and deployment of the Internet's infrastructure in general, and specifically that the home automation market, in the inventor's opinion, is much too fragmented for any single hardware manufacturer to dominate and become the de facto standard in the home automation market. The field of home sensor/actuator-controlled home systems has become more complex and sophisticated as electronic hardware also becomes more complex and sophisticated.

Systems provided for home installation and use include alarm systems, watering systems, lighting systems, heating and air conditioning systems, pool systems, and so on. Of these systems, there are varying degrees of automation and programmability features that are built in to each separate system in the current state of the art, and in a variety of wiring, communication, and control standards and protocols. For example, an automated and programmable watering system may have an electronic control box that is wired to each distributed actuator that controls distributed watering components. Such a box may use a programmable timer function to control how often and what areas covered by the physical components of the system will be watered. A client or user will typically set-up each part of the system to actuate at specific times for a specific length of time as is well known in the art.

The above example represents an actuator-control system. In some more advanced watering systems, a rain sensor may be provided and integrated to such a system so that watering may be temporarily discontinued or reduced such as during periods of extended rain. The rain sensor, picking up precipitation, would override the actuator and shut down watering until the next timed watering interval.

An example of a sensor-control system would be an alarm system. An alarm system responds to signals from sensors distributed within an area the system is designed to protect. Types of sensor capability used in an alarm system may vary widely from system to system. Some use photoelectric beams. Others use laser technology. Still others use movement and/or audio detectors or physical circuits,

which when broken, trigger the alarm. There are many methods as is well understood by the skilled artisan.

In typical prior art implementation, a sensor and/or actuator-control system of the types described above are made available to consumers by usually separate enterprises, which provide all of the hardware and wiring necessary for function of such systems. Each system will have a control box provided and adapted to allow a home or business owner to program and implement any functions provided by the system. If a user has more than one type of system installed then he or she will have more than one control box to program and use. In typical prior art systems each control box must be programmed on-site and changed on-site if different settings are desired.

More recently, with the advent of powerful home computers, many companies that provide home automated systems have provided means including software, whereby a user may program a system from his or her personal home computer. In this way, a user is not required to physically interface with a control box in order to make changes to a system. In these types of systems a cable, such as a serial cable, is provided from a control box to a PC. By utilizing a software program, a user may send commands to the control box (adapted to receive serial commands) associated with a system such that programming and monitoring may be conducted from the PC.

With the advent of the well-known Internet network, some companies have provided a means to control home systems from a remote computer using the Internet as a conduit, and a home computer as a host. In this way a user may make changes and control home-system function from the office or from a mobile computer such as a Laptop computer. In some cases, this is accomplished through a company hosted web-site, which typically only supports this proprietary hardware standard and is intended to help increase sales of the hardware, but is not intended to be a web-portal through which a user can control and monitor home systems. In other cases, the method used is direct computer-to-computer linking.

Although companies that provide home automation systems have been moving toward remote access for controlling such systems, such companies typically provide

only access to proprietary system components, which allow control to only those systems set-up for a user by the company. For example, if a user has a remote-access alarm system, and a remote-access heating and air conditioning system, then there will be two separate methods and apparatus for enabling control and monitoring of such
5 systems.

In a more recent development, known in the art and to the inventor, some companies, realizing the potential for attracting business from Internet users, have developed computerized home systems that may be customized for individuals having a variety of home automation needs. For example, a user may desire a remote access
10 system by which he or she can control an air conditioning and heating system, an alarm system, a watering system, and a lighting system, all from a single interface. Such systems are termed "smart home systems" to those who are familiar with this newer art.

The above-described smart systems require a powerful computer control
15 station having ports and cables leading to distributed components of each integrated component system. Each separate component system such as a watering system, a heating/air system, an alarm system, a door locking/unlocking system, and so on, must be integrated with components that are capable of communicating with a central computer unit by way of cable. Such systems are quite expensive and therefore usually
20 are above the affordable range of an average homeowner. Such smart systems are generally installed when new homes are being built, and are advertised as features of such homes. Because of extensive cabling, equipment requirements and labor needed to cosmetically install such smart systems in a home, such systems are not practical to an average homeowner.

25 What is clearly needed is a remotely accessible "smart home-system" that can be modularly installed and married to existing home- automation systems and single home-appliances without requiring a system of interconnecting wiring or expensive computer control equipment. Such a system would offer any user complete control over a variety of systems and appliances from a home PC or a remote PC using a single
30 interface while eliminating or reducing expenses related to "hardwired

implementations” and proprietary equipment. What is also needed is a web portal site that allows the end user to virtually create a home automation system, using virtual devices and standards according to any available model, and to then purchase the parts and create the real system, which may then be controlled through the web portal
5 according to an individualized user page.

Summary of the Invention

10 In a preferred embodiment of the present invention a control unit to facilitate remote programming for local control of systems and appliances is provided, comprising a microcontroller for managing functions of the control unit; an input-output (I/O) section coupled to the microcontroller for interfacing voltage levels between the systems and appliances and the microcontroller; a system memory for
15 storing executable code and data; a wiring interface for connecting input and output points from the control unit to the system or appliance; and an RF section communicating with the microcontroller and memory for receiving programs and data. With connections made between the wiring interface and the controlled system or appliance, the microcontroller provides outputs to operate functions on the system or
20 appliance in response execution of control code and stored data by the microcontroller, the control code and data received via the R/F section.

In some cases the microcontroller produces control outputs partly in response to input from sensors on the controlled system or appliance. There may also be additional sensors in the control unit, wherein the microcontroller produces control outputs partly
25 in response to input from the additional sensors. Further, the microcontroller may monitor sensors, whether internal or on the controlled system or appliance, and transmit status data via the RF section.

In another aspect a for controlling a system or appliance, comprising steps of (a) connecting a control unit to the appliance by a wiring interface, the control unit
30 comprising a microcontroller for managing functions of the control unit, an input-

output (I/O) section coupled to the microcontroller for interfacing voltage levels between the systems and appliances and the microcontroller, a system memory for storing executable code and data, a wiring interface for connecting input and output points from the control unit to the system or appliance, and an RF section

- 5 communicating with the microcontroller and memory for receiving programs and data; (b) receiving control code and data from a remote location by RF signals via the RF section; and (c) operating functions on the system or appliance in response to execution of the received control code and data by the microcontroller.

In this method in a preferred embodiment, in step (c), the microcontroller
10 produces control outputs partly in response to input from sensors on the controlled system or appliance. There may also be additional sensors in the control unit, and in step (c) the microcontroller produces control outputs partly in response to input from the additional sensors.

There may also be a step (d) for monitoring sensors, whether internal or on the
15 controlled system or appliance, and for transmitting status data via the RF section.

In another aspect of the invention a base station for managing one or more control units is provided, comprising a microcontroller for managing functions of the base station; system memory coupled to the microcontroller for storing executable code and data needed in base station functions; a communication port for
20 communicating with the Internet; and an RF section. The base station receives control code and data via communication port, and transmits the control code and data via the RF section to the one or more control units for use in controlling systems and appliances.

In one embodiment of the base station the communication port is one of a
25 standard serial or parallel communication port compatible with a personal computer (PC) and wherein the PC handles communication with the Internet for receiving control code and data, and transfers the control code and data to the base station. In preferred the base station records and identifies all remote control units in its range, and selectively transmits data and control code to the control units via the RF section,

the incoming control code and data being identified for individual ones of the control units.

In some embodiments the base station is enabled to identify and communicate
5 with up to 256 control units selectively. Also the base station receives status data via the RF section from control units, and transmits the status data identified according to the control unit providing the status data, to the Internet.

In yet another aspect of the invention a method is provided for managing control functions for a plurality of systems and appliances in a home or business area,
10 the systems and appliances connected to control units having each an RF section for receiving control code and data and transmitting data. This method has steps of (a) identifying each control unit uniquely electronically; (b) providing a single base station in the home or business area, the base station having a port for communication with the Internet and an RF section for communicating with the plurality of control units; and
15 (c) downloading control code and data from an Internet site by the base station identified for individual ones of the control units, and transmitting the downloaded control code and data selectively to the individual ones of the control units.

In this method in step (c), the base station also receives status data from the control units identified as to the control unit sending the data, and forwards the status
20 data to the Internet site. In some cases the communication port is a direct Internet connection, and in others one of a standard serial or parallel communication port compatible with a personal computer (PC), wherein a connected PC handles communication with the Internet for receiving control code and data, and transfers the control code and data to the base station.

25 In yet another aspect a control system for systems and appliances in a home or business area is provided, comprising a plurality of control units wired to sensors and actuators of individual ones of the systems and appliances, the control units having each a microcontroller, a system memory and an I/O section, and an RF section for external communication; a base station in the home or business area having a
30 communication port to the Internet and an RF section for communicating with the

plurality of control units; and an Internet site executing software enabling a subscriber associated with the home or business area to interact with the base station. The Internet site software provides an interface for the subscriber to review status of systems and appliances having connected control units in the associated home or
5 business area, and to enter control code and data addressed for individual ones of the control units in the home or business area.

In this control system the base station may comprise an Internet browser and an Internet-capable port for Internet access. Otherwise there may be a standard serial or parallel port for connection to a personal computer, and the personal computer
10 accomplishes necessary Internet browsing functions. In preferred embodiments individual control units are configured to the base station by each a specific address. In this aspect a subscriber has a specific web page on the Internet site, wherein all configured, installed and active control units in the home or business area with which the subscriber is associated are indicated. The base station, through the respective RF
15 sections, configures any new control unit brought into the home or business area by adding the control unit to a list managed by the base station, including assigning the control unit an address, and communicating to the associated web site details regarding the new control unit in a manner that the subscriber may monitor and control the system or appliance associated with the new control unit through the web site. In an
20 alternative embodiment the base station, through compatible magnetic induction equipment installed in both the base station and any new control unit, configures any new control unit brought within a maximum induction range by adding the control unit to a list managed by the base station, including assigning the control unit an address, and communicating to the associated web site details regarding the new control unit in
25 a manner that the subscriber may monitor and control the system or appliance associated with the new control unit through the web site.

In yet another aspect a method for managing control functions for a plurality of systems and appliances in a home or business area is provided, comprising steps of (a) connecting a control unit to each system or appliance, each control unit enabled to
30 receive input from sensors and to actuate functions of the system or appliance to which

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it is connected, with each control unit having an RF section for receiving control code and data and transmitting data; (b) identifying each control unit uniquely electronically; (c) providing a single base station in the home or business area, the base station having a port for communication with the Internet and an RF section for communicating with the plurality of control units; (d) downloading control code and data from an Internet site by the base station identified for individual ones of the control units, and transmitting the downloaded control code and data selectively to the individual ones of the control units; and (e) providing a web site where a subscriber associated with the home or business area may access a web page having an interface for displaying status of each active control unit in the home or business area, and allowing the subscriber to enter functions and data for controlling the active control units in the home or business area.

In yet another aspect of the invention an Internet subscription service having a system comprising a plurality of web pages specific to individual subscribers, and accessible interactively by the subscribers through any Internet appliance is provided, characterized in that the system communicates for each web page and subscriber with a base station at a home or business site associated with the subscriber, wherein individual base stations stream status information regarding systems and appliances at the home or business site to the web site for posting on the associated web pages, and commands and data entered by a subscriber in a web page for a specific site are streamed to the base station at the home or business site.

In the various aspects of the invention described in enabling detail below, for the first time a system is provided wherein a person may use the Internet to program, control, and monitor a large number of systems and appliances at a home or business, with the systems and appliances being standalone units not requiring extensive wiring to a central control unit or system.

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Brief Description of the Drawing Figures

Fig. 1 is an overview of a communication network adapted to facilitate remote configuring and monitoring of automated home-systems and appliances according to an embodiment of the present invention.

Fig. 2 is an overhead view of the user premise of Fig.1 illustrating various automated home-systems and appliances adapted for remote control according to an embodiment of the present invention.

Fig. 3 is a block diagram illustrating various components and circuitry of the base station of Fig. 1 according to an embodiment of the present invention.

Fig. 4 is a block diagram illustrating various components and circuitry of a sensor/actuator device according to an embodiment of the present invention.

Fig. 5 is a block diagram illustrating an exemplary wiring relationship between a sensor/actuator device and an automated home-system according to an embodiment of the present invention.

Fig. 6 is a process flow diagram illustrating various logical steps for re-setting or monitoring an automated home-system or appliance from a remote location according to an embodiment of the present invention.

Fig. 7 is a perspective view of a sensor/actuator device being configured to a base station using magnetic induction technology according to an embodiment of the present invention.

Fig. 8 is a process flow diagram illustrating logical steps for configuring a new sensor/actuator device to a base station according to an embodiment of the present invention.

Fig. 9 is a block diagram illustrating a functional business relationship between various entities providing service and/or equipment and their relationship to a common customer base according to an embodiment of the present invention.

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Description of the Preferred Embodiments

According to a preferred embodiment of the present invention, a method and apparatus, including software, is provided and adapted to facilitate automation of various home function systems and/or appliances such that communication to and from such devices and systems may be facilitated from a remote location using a wide area network (WAN) such as the Internet as a conduit. The methods and apparatus of the present invention are provided in enabling detail below.

Fig. 1 is an overview of a communication network and architecture system 9 adapted to facilitate remote configuring and monitoring of automated home-systems and appliances according to an embodiment of the present invention. System 9 comprises the Internet and public-switched-telephone-network (PSTN) represented herein by a network cloud 11, a cellular telephony network represented by a network cloud 13, a user premise 15, a remote premise 19, and a mobile unit 17.

Network 11, in this example, represents both a switched-packet-data-network (SPDN) such as the well-known Internet network and a telephony network such as the well-known PSTN network. The inventor chooses to represent both networks in this manner because of the ambiguity related to both networks as they often use the same equipment and infrastructure. Network 11 may be a combination of the Internet and a private telephony network, a private WAN and the PSTN network, or any combination. The network representation is also intended to include such as high speed broadband fiber optic networks and wireless implementations. In a preferred embodiment, the Internet and the PSTN are represented because of their large public access capabilities.

Network 11 considered as the Internet may be assumed to contain all of the equipment lines and connections that are known to exist in such a network. Network 11 as the PSTN may be assumed to contain all of the equipment, lines, and connections known to exist in such a network. Various equipment found in both networks such as computer nodes, IP routers, telephony switches, telephony routers, service provider stations (Internet or telephony), and the like are presumed known in the art and

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therefore are not described in detail herein. Cloud 11 will hereinafter be designated as Internet 11 or PSTN 11 when referring to either network.

User premise 15 is illustrated as connected to an Internet backbone 23, which represents the lines, equipment, and connection points making up the Internet network.

5 Premise 15 represents a user's home or business having various automated and functional systems or appliances (not shown) installed therein or thereabout. Premise 15 is connected to backbone 23 by way of an Internet connection line 49. Internet connection line 49 may be one of many types of known services such as integrated services digital network (ISDN), digital subscriber line (DSL), standard plain old
10 telephone service (POTS) line with modem, cable modem, wireless link, and so on. In one embodiment line 49 may be a continuous connection.

A personal Computer PC 33 is provided within premise 15 and is adapted for normal computer operation and Internet access capability as is known in the art. PC 33 acts, in this example, as an Internet host computer to a peripheral base station (BS)
15 35, which is provided and adapted according to an embodiment of the present invention, to communicate using radio frequency (RF) technology with at least one sensor/actuator device (S/A) 37. S/A 37 is provided and adapted, according to an embodiment of the present invention, to facilitate control and monitoring of an associated home-system or appliance. S/A 37, like BS 35 is adapted to communicate
20 using RF technology.

Applicable RF communication technologies that may be used to practice the present invention may include but are not limited to Time-Division-Multiple-Access (TDMA), Frequency-Division-Multiple-Access (FDMA), Code-Division-Multiple-Access (CDMA) systems and so on. The RF technology employs a well-known
25 spread-spectrum-technology (SST) to minimize interference and to enhance communication where there is no line of sight (LOS) between an S/A device such as S/A 37 and a BS such as BS 35.

BS 35 as well as S/A device 37 may be encased with durable lightweight materials such as polymeric materials typically used for such purpose. Materials used
30 for encasing S/A device 37 may also be made water tight, or at least weather resistant

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for units placed outdoors where components require protection from the elements. Similar provisions may be made for BS 35. As such, BS 35 and S/A device 37 are designed to be lightweight and small enough to be easily handled and carried.

BS 35 is connected to PC 33 by a serial cable such as a USB or other older
5 type known in the art, and functions as a peripheral as previously described. In one embodiment, Infrared or RF communication may be substituted for a serial cable connection. Also in one embodiment BS 35 may also have a telephone connection that functions as an Internet line from BS 35 directly to Internet 11. If only one phone line is available, then an RS connection is established between BS 35 and PC 33, which
10 acts as a host computer. While there will only be one BS such as BS 35 within a user premise such as premise 15, there may be many S/A's such as S/A 37 resident within premise 15. An S/A such as S/A 37 is associated and connected to a home system or appliance for the purpose of allowing remote control over such systems or appliances through BS 35 and PC 33.

15 A remote premise 19 is illustrated as connected to backbone 23 in Internet 11 by an Internet connection path 25. Internet connection path 25 may be of a variety of known connection means as was described above with regard to line 49. Premise 19 represents such as a location remote from premise 15, perhaps an office workplace or other location where a user associated with premise 15 may keep a second PC such as
20 PC 21 as represented herein. Therefore, a user associated premise 15 may travel to such as premise 19 and access PC 33, BS 35, and S/A 37 using Internet 11 as a conduit.

Mobile unit 17 represents a mobile state of a user such as one associated with premise 15 whereby a Laptop computer 39, or another mobile and wireless Internet-
25 capable appliance may be used to access PC 33, BS 35, and S/A 37 at premise 15. In this example, Internet access is represented by a wireless satellite-connection 41 into cellular network 13 to a satellite 51 provided and adapted for relaying data via a wireless connection 43 to a network interface (NI) 31, and thus onto Internet network 11.

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NI 31 comprises a processor 45, connected to backbone 23 and a satellite receiver/transceiver 47 adapted to receive and transmit in wireless mode. Such simple representation is intended to represent a wireless network interface known in the art for enabling wireless access to an Internet landline (backbone 23). Processor 45 is adapted as an entry point onto network 11 for wireless users having wireless Internet services as known in the art. In another embodiment, a user operating from a mobile unit such as unit 17 may, by using an Internet appliance such as Laptop 39, bypass Internet network 11 and achieve a cellular connection directly to BS 35 if desired and suitable according to enterprise rules and protocol.

A server 27 is provided within Internet 11 and adapted as a user interface for users to access their home systems or appliances through Internet 11 from such as premise 19 or mobile unit 17. Server 27 is hosted by a company providing a service of the present invention, hereinafter referred to simply as the service, which includes provision of customer premise equipment (CPE), as has already been introduced herein as BS 35 and S/A 37 within premise 15. Server 27 has a mass repository 29 connected thereto by data link, but which may be a part of server 27 or of another Internet-connected server. Repository 29 is adapted to store data about users subscribed to a service facilitated through server 27, as well as data regarding other parameters associated with S/A devices and BS stations. It is assumed that appropriate software is provided and adapted to allow efficient access to and manipulation of data stored in repository 29.

Instances of software (SW), which are provided and adapted in various capacities to facilitate practice of the present invention, are illustrated as executing at premise 15 on PC 33, at premise 19 on PC 21, at mobile unit 17 on Laptop 17, and on server 27 within Internet 11. SW residing on each of the Internet appliances, 39, 21, and 33 is provided in the form of a web browser plug-in application that allows users to access home systems and appliances through Internet 11. SW residing on server 27 functions to manage, through DB software interface, user accounts and information and data regarding client installations. SW residing on server 27 also functions in the capacity of web-server software allowing posting of stored data as well as received

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data, performing automated software and firmware updates, performing security procedures, and other user interaction processes. Firmware (not shown) for facilitating practice of the invention is provided in BS 35 and each of S/A's such as S/A 37.

5 The service of the present invention has several objectives. One is to provide users with S/A devices such as S/A device 37 and a base station such as BS 35. This equipment allows a user to modify existing home systems such as watering systems, video monitoring systems, heating and air systems, lighting systems, and the like such that they may be accessible and controllable from remote locations. Similarly, a user
10 may, with the equipment of the present invention, modify singular or plural (like appliances) such as smoke alarms, gate locks, kitchen appliances, etc to be accessible and controllable from remote locations. Another objective of the service is to provide a means of notification to remote users in case of any emergency concerning any of a user's configured systems or appliances. Still another objective of the service is to
15 provide a new and novel conduit through which manufacturers of home systems and appliances may advertise to consumers in a direct way.

 The service of the present invention utilizes RF technology for communication between a BS such as BS 35 and a plurality of S/A devices such as device 37 as described above. In this way, automated systems may be conveniently configured and
20 activated without using a mass cabling structure common to prior art systems described in the background section. In addition to existing home systems and appliances, which may be retrofitted with S/A devices according to embodiments of the present invention, new systems and appliances may be offered that are already equipped with S/A devices such as device 37.

25 In order to practice the present invention, a user powers on a system or appliance-compatible S/A device 37, and configures the device to BS 37. The inventor provides, in one embodiment, a magnetic induction system and procedure for enabling device configuration. The configuration procedure allows automatic device configuration by bringing the device close to BS 35 for purpose of initiating a magnetic
30 induction data transfer, which is described in more detail later in this specification. In

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other embodiments RF, or other data transfer technique may be used. After an S/A device is configured, the user wires the configured S/A device 37 to his or her existing system or appliance. For example, one S/A device might be configured to a specific watering system whereas another S/A device might be configured to a specific lighting system, and so on. Each S/A device such as device 37 is enabled to communicate using one of the above-mentioned RF technologies to a central BS such as BS 35. The RF capability is bi-directional half-duplex in this example, however full duplex may also be supported in some embodiments.

S/A devices such as device 37 may be created for custom applications or provided for standard applications. Actual sensors and actuators used in such devices will vary somewhat on implementation. However, some standardization may be achieved in most instances.

Once an S/A device 37 is configured to a BS such as BS 35 and wired to a home system or appliance, a user may interact with the system or appliance from a remote location such as from premise 19, or from his or her own PC such as PC 33 in premise 15.

After configuration, a new S/A device is registered in repository 29 and becomes an added part of a user's overall portfolio of registered home-systems and appliances. If a user is operating from a remote premise such as, perhaps, premise 19, then he or she would log-on to Internet network 11 using a browser application executing on PC 21 and a suitable Internet connection means such as represented with line 25. Once on-line, server 27 is contacted and password is given to verify a user's authenticity. SW residing on PC 21, as a browser plug-in, enables automated navigation to and seamless interaction with SW running on server 27.

Once authenticated by the service, a user may then access a personalized hyper-text-markup (HTM) page that displays real-time status about all of his or her registered home-systems and appliances. For example, a user may see whether or not heating is active and what temperature is being observed with regard to a heating and air conditioning system. A user may see if his or her watering system is activated and what the current watering intervals are. The user may also activate and visually

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monitor video systems. In this way, all real-time data may be displayed such that a user may see all systems, appliances and status as well as settings through a single interface.

Through the same interface, a user may initiate setting changes to any of or all home systems or appliances that he or she has registered with the service. Such setting changes may be permanent or temporary. For example, if a remote user notices that it is raining, he may access his home watering system through the Internet, select the watering system, and send a signal through the Internet to have the home system turn it off. Moreover, an S/A device such as device 37 may be wired to an associated sensor on a watering system that enables "smart watering" thereby automatically initiating a temporary shut down of the system to save water. There are many possibilities.

Data updates in a preferred embodiment are uploaded automatically from BS 35 to server 27 on a periodic basis. In some embodiments, a continuous status update feature may be provided. In this way, a remote user may have current data regarding function and conditions at home. A wireless remote user at Laptop 39 at mobile unit 17 may enjoy the same service and function capability as from remote premise 19 using cellular network 13 for communication. The exact paths of data communication through Internet 11 or other interconnecting network from each remote premise 17, and 19 to home premise 15 and local equipment will be apparent to the skilled artisan.

In this example, SW executing at server 27 enables database communication for users and is a principal application of the service. In an alternative embodiment, a user may initiate off-line setting changes by utilizing such as Laptop 39, or home PC 33 directly to BS 35, thus bypassing server 27. However, such changes will be uploaded to server 27 at a next reporting interval for BS 35. To register a new S/A device to the service, Internet connection to server 27 must be achieved to activate the new device parameters.

It will be apparent to one with skill in the art that a user may access his or her home systems and appliances from any Internet appliance capable of navigating the Internet without departing from the spirit and scope of the present invention. The only

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requirement is that such an Internet appliance can maintain an Internet connection, has enough memory for SW implementation (browser plug-in) and sufficient input capability for interaction with server 27.

Fig. 2 is an exemplary structured plan view of user premise 15 of Fig. 1 illustrating various automated home-systems and appliances adapted for remote control according to an embodiment of the present invention.

BS 35 is installed in a central location in premise 15 such that its RF communication range R covers all S/A devices (designated in plural herein by distributed Xs). As previously described, BS 35 communicates directly to S/A devices (Xs) as illustrated by dotted double-arrows connecting BS 35 to two distributed Xs as shown. Once S/As are wired to existing systems or appliances, they are generally held stationary by being connected to the installed mechanism. In this way RF range is known by BS 35. However, in some embodiments, an S/A device may be configured to a non-stationary appliance or appliances, such as a plurality of floor-space heaters or the like with rollers that may be moved to different locations from time to time. In this case, BS 35 and S/A devices would perform an RF range check when activated by virtue of installed RF components known in the art.

In this example, premise 15 has an automated back-yard watering system (WS) 53, which supplies water to a garden 55 and a peripheral hedge row 57 as illustrated by dotted waterlines connecting the above-mentioned elements to WS 53. An associated S/A device (X) is wired to WS 53 and controls actuation, timing, and any sensor function therein. For example, WS may be programmed to initiate watering once in the morning for garden 55 and twice daily for hedgerow 57. WS 53 may have a precipitation sensor installed enabling automated shutdown if rain occurs. Note that all S/A devices must remain within the effective range R of BS 35 although beneficial effects from systems such as watering systems are, of course, not range-limited.

Premise 15 has a second front-yard watering system WS 59 that is designated to supply water to a flower garden 60. An S/A device (X) associated with WS 59 may be equipped with several different settings related to which type of flowers in garden 60 will be watered at what times to what extent. A precipitation sensor as well as a

temperature sensor may be provided as part of the S/A associated with WS 59 thereby providing a feedback mechanisms that act to change settings automatically.

Lighting systems registered with the service and part of premise 15 include outdoor lighting system (OLT) 67 (back yard), outdoor lighting system (OLT) 75
5 (front yard) and lighting system (LT) 69 (indoor). Systems 69 and 75 may have their associated S/A devices (X) equipped with many settings controlling when light activates, the intensity of light, and so on. Additional sensors, part of lighting systems may be wired to S/A devices with such sensors providing measurement of existing outdoor sunlight such that systems are automatically actuated when the outdoor or
10 indoor light levels fall to a certain intensity. LT 69 may have several actuation settings such as may be required for different parts of premise 15. For example, den lights may turn on at a certain time whereas bedroom (BR) lights may activate at a different time and so on.

Other systems included in this example are a heating and air- conditioning
15 system (H/A) 63 and an alarm system (ALM) 71. Each system has an S/A device associated with it (X). One with skill in the art will appreciate that H/A system 63 may have multiple setting options that are triggered by mode and temperature readings. For example, there are two modes, heating and air. Each mode is thermostatically controlled for automation purposes. Each mode may also be divided geographically
20 such that certain areas of premise 15 receive different coverage. For example, heating may be programmed to actuate in the den and living room (LVR) when the thermostats in those rooms drop to a certain degree. In another area such as, perhaps, the bedrooms (BR), heat may be activated when thermostat readings in those areas drop to a certain degree other than the threshold established for the living room and
25 den areas. Air mode may have similar enhancements provided for separate areas. An S/A device for H/A 63, would be programmed with all of the required settings and actuation parameters that are available with the H/A system.

ALM system 71 may use a variety of technologies in singular or combined fashion. An S/A device associated with ALM 71 would incorporate all of the settings

and actuation triggers established with ALM system 71 including video recognition, laser triggers, photoelectric triggers, motion triggers, broken circuit triggers and so on.

In addition to the automated home-systems described above, there are several automated appliances in premise 15 that are registered with the service. While systems
5 such as watering, heating, air conditioning, and lighting systems have more or less standardized functions, singular appliances present opportunities for much more creativity in programming an associated S/A device.

A cooking range 61 located in a kitchen area (K) is, in this example, included and registered with the service. Range 61 may be remotely controlled by adapting an
10 S/A device (X) thereto to allow a user to initiate such functions as, “begin oven pre-heating 30 minutes before my arrival home at 6 PM”. Another function may be to “begin self-cleaning cycle at noon on Wednesdays”. There are many possibilities, which may be initiated either locally or remotely as described in Fig. 1. Other appliances, which may be remotely controlled and which are illustrated herein include a
15 water heater WH 70, a space heater (H) 73 located in the garage (GR), an entertainment center (ENT) 72 located in the living room area and a washer/dryer (W/D) 65 located in the kitchen area.

It will be appreciated that S/A devices (X) associated with the on-site appliances may be configured to control either a sub-set or all of the functions
20 provided by these appliances. It will also be appreciated that additional enhancement may be provided to such appliances that are not typically offered, or even possible, with the appliance without the S/A device. For example, if ENT 72 is a television set, and a user is at work such as at remote premise 19 of Fig. 1, then he or she may initiate a shut-down of ENT 72 at a time when children are home and supposed to be doing
25 homework or chores. An S/A device associated with ENT 72 would be configured to and provide remote control over such function parameters.

It will be apparent to one with skill in the art that, in this case, a home, and in other cases, a business may be activated as a “smart home” or “smart business” by way of the present invention without extensive mass cabling associated with current art
30 systems, and that appliances and systems in the home not remotely programmable and

controllable become so with the integration with the inventive system described herein. S/A devices are not limited to being standard to offered appliances or systems, but may be created in customized fashion for virtually any electronically controlled appliance or system. All that is required to integrate a system or appliance to an S/A device is
5 appropriate by-pass wiring connections from system or appliance controls to provided S/A terminals.

In this example, there are 12 illustrated S/A devices specific to their host systems or appliances. However, the system of the present invention in a preferred embodiment provides for as many as 256 S/A's per BS.

10 Fig. 3 is a block diagram illustrating various elements comprising base station 35 of Fig. 1 according to an embodiment of the present invention. BS 35 as previously described is a computerized unit with RF communication capability. As such, BS 35 has an RF section provided therein and adapted to enable RF communication with such as S/A device 37 of Fig. 1. RF section 85 comprises a receiving (RX) block 93, a
15 transmission (TX) block 97, and a RF chip-set 95, which provides RF functionality. RX block 93 and TX block 97 contain all of the required circuitry as known in the art for acquiring and broadcasting radio signals.

Chip-set 95 contains all of the required hardware and circuitry to enable RF communication as known in the art. In this example, RF section 85 uses a 900MHz
20 spread-spectrum phone band, which is known by the inventor to be publicly accessible and available at low cost due to its maturity related to existing options. However, other frequencies may be utilized without departing from the spirit and scope of the present invention. RF section 85 is connected to a communication bus structure 99 provided and adapted to manage internal communication between various modules and
25 components in BS 35, and also to appropriate antenna apparatus not shown.

BS 35 has a power supply module 81 provided therein and adapted to supply power. Power source may be from a local power outlet. In one embodiment BS 35 may be powered by a rechargeable battery pack. Power supply 81 is connected to all power-using elements in the BS, and electronic elements, including processor 79 are
30 interconnected by a communication bus 99.

Processor 79 has a BIOS section 91 provided therein and adapted to control pre-boot operations and normal booting functions as may be required pre-configure functionality and to bring BS 35 to a full powered-on state, as is well-known in the art. In a preferred embodiment, BIOS 91 is flashable such that data written thereon may be altered. Such data or code is responsible among other things for managing device addressing, RF communications protocols, and over-the-air RF encryption in the commands issued between the BS 35 and S/A devices such as device 37 of Fig. 1.

Processor 79 also has a read only memory (ROM) section 89 to hold permanent data such as an operating system routine required for operation of BS 35. A random access memory (RAM) sector is provided and adapted to hold temporary data such as routines resulting from setting changes and the like, and temporary data. A non-volatile version of RAM 87 may also be provided to hold data that is to be retained after BS 35 is powered off.

An input/output port (I/O) 77 is provided and connected to bus structure 99, and adapted for serial input and output capabilities over a serial cable connection to a host such as PC 33 of Fig. 1. The serial connection may be wireless instead of hardwired as previously described. A USB or other known serial communication protocol may also be used.

User-initiated programming from such as web-server 27 of Fig. 1 is sent in the form of binary command files. Such commands, or end programs as termed by the inventor, are received by BS 35 over the serial cable from PC 33 and stored in RAM 87 for interpretation and subsequent execution. BS 35 is a master unit and treats all S/A devices under its control as slaves. That is to say that BS 35, by virtue of its described capabilities and controls, coordinates all S/A devices under its umbrella according to received input developed at server 27 (Fig. 1) in this example.

BIOS 91 contains a line-based interpreter for Pseudo-code binary command files, indexing and addressing protocols, interrupt handling routines, RF transmission infrastructure, and so on. A real-time embedded clock (not shown) is provided in BIOS 91 that will roll over every seven days. Such a clock synchronizes with a

command source server such as server 27 (Fig. 1) every time it connects thereto. It is this clock that dictates timing of commands sent by a user.

A telephony circuitry 83 is provided and connected to bus structure 83. Circuitry 83 contains all of the circuitry and components required for dial-up telephone access as known in the art such as may be required of a stand-alone unit in one preferred embodiment. In a stand-alone version of BS 35 a telephone line would be plugged in and access to Internet 11 may be accomplished with an internal modem and dialer. An Internet access program would also be required. In another embodiment, circuitry 83 may be used to page or telephone user's to alert them of a perceived emergency regarding one of a user's registered home systems or appliances.

It will be apparent to one with skill in the art that BS 35 may contain fewer or more individual components than are illustrated herein without departing from the spirit and scope of the present invention. For example, telephony circuitry 83 is not required to practice the present invention in all embodiments. Moreover, a component that enables configuration of S/A devices by magnetic induction may be added. Such a component is not described in this example, but is described in enabling detail later in this specification as magnetic induction is not specifically required for configuration purposes. The inventor intends that the example illustrated herein represents one of a variety of possible BS circuitry configurations.

Fig. 4 is a block diagram illustrating various components and circuitry of sensor/actuator device 37 of Fig. 1 according to an embodiment of the present invention. S/A device 37, like BS 35, is a computerized device capable of RF communication. As such, S/A device 37 has an RF section 101 for RF communication. RF section 101 comprises a receiving (RX) block 103, a transmission (TX) block 107, and an RF chip-set 105.

RX block 103 contains all of the circuitry and components required for receiving RF signal transmissions broadcast from BS 35 of Fig. 1. TX block 107 contains all of the circuitry and components required for transmitting RF signals to BS 35 of Fig. 1. RF chip-set 105 contains all of the hardware and components required for enabling RF communication as is known in the art and described in Fig. 3 above

with respect to chip-set 95. A good example of an existing and compatible chip-set implementation for chip-set 95 and chip-set 105 is an Infineon™ 840MHz digital RF chip-set known to and available to the inventor.

Device 37 has an internal communication bus structure 99 provided therein and
5 adapted to manage communication between various illustrated modules. A memory (MEM) 109 is provided within device 37 and adapted to store various temporary and permanent routines required for operation and RF protocol dissemination and implementation. MEM 109 may be any combination of ROM/RAM as deemed necessary for operation. It will be apparent to a skilled artisan that an S/A device such
10 as device 37 may vary according to implementation. Therefore MEM 109 may vary accordingly. MEM 109 is of a size to be suitable for any specific implementation.

A master actuator 111 is provided within device 37 and connected to bus structure 99. Actuator 111 is adapted as a controlling actuator for any connected home system or appliance that may be wired thereto. A master actuator such as
15 actuator 111 replaces any generic actuators inherent to connected systems or appliances. For example, if a watering system were connected to device 37, then actuator 111 would turn on or “actuate” the system. It is not always, or specifically required that an actuator such as actuator 111 be present in a device such as device 37. Device 37 may be adapted to control a system or appliance through a generic system
20 or appliance actuator. However, bypassing a generic actuator represents a convenience in wiring installation. In an alternative preferred embodiment, however, S/A device 37 has an I/O system for providing outputs of suitable voltage and current ability to operate components of connected systems and appliances, as well as to accept inputs from sensors in those systems and appliances, and to translate incoming
25 sensor signals into suitable signals on bus 99 for use by other elements of the S/A device. In this case one may assume that elements 111, 113, and 121 comprise an input-output (I/O) section and interface between external controlled systems and appliances and the S/A device. This I/O region is necessary because outputs by the microcontroller must be converted to voltage and current levels that are needed for
30 driving actuators on the controlled system or appliance, and inputs from the system or

appliance must be converted to the necessary voltage level needed for the microcontroller.

Wiring interface 121 is provided and connected suitably to sensors block 113 and actuator block 111 by wiring 114. Wiring interface 121 may be of the form of a plug or other type of terminal connector. Interface 121 may vary in scope and physical characteristics from one S/A device such as device 37 to another. A wiring interface such as interface 111 is adapted to a home system or appliance to which the associated S/A device is configured. A wiring interface such as interface 121 may include such as output control (actuator) lines, sensor lines, a ground wire, and so on. There are many electrical connection techniques known in the art and available to the inventor for implementing a wiring interface such as interface 121, one of which is a simple terminal block, although in some cases a standard connector plug may be provided, to which a plug for a specific appliance or system may be engaged.

Device 37 has a power supply 119 adapted to supply necessary power. Power supply 119 may be a battery, a rechargeable power pack, or a wall plug, or a combination thereof. Power supply 119 provides power by suitable lines to all power-using elements of the S/A device, and all electronic elements communicate on bus 99. Micro controller 117 is adapted to control and manage all function specific to device 37 according to input received from a BS such as BS 35 of Fig. 1 and, in some cases, incoming sensor information.

An internal real-time clock is provided within device 37 and connected to bus structure 115. Clock 115 is synchronized with the internal clock of BS 35 and with an internal clock (not shown) residing in a configuration server such as server 27 of Fig. 1. In this way, all timing function associated with run-time routines and actual home-system or appliance process is synchronized. Optional internal sensors 113 are provided within S/A device 37 and connected to bus structure 99.

Internal sensors 113 may include any sensor devices which may be deemed appropriate for use as feed-back mechanisms for automated control of a connected home-system or appliance. Examples of such sensors include, but are not limited to a temperature sensor, precipitation sensors, altimeters, light sensors, sound sensors,

vibration sensors, and so on. Sensors 113 may be included in an S/A device such as device 37, and in many cases appended to the device through wiring interface 121, in order to enhance functionality of a connected home-system or appliance. In some embodiments, existing home-system or appliance sensors are wired to an S/A device
5 such as device 37 through such as wiring interface 121.

Referring now to both Figs. 3 and 4, bi-directional communication is achieved by virtue of respective RF sections 85 (Fig. 3) and 101 (Fig. 4). BS 35 receives instruction from such as server 27 of Fig. 1, communicates such instruction to S/A device 37 via RF signals, and S/A 37 then operates a connected home-system or
10 appliance according to the received instruction and, in many cases, sensor inputs. The novel implementation of RF communication allows a “smart home” to operate with 256 or more connected systems or appliances without hardwiring with massive cable structures. The number of systems operable is a scaling function in design.

In functions of the present invention where remote configuration is involved,
15 there are several separate communication protocols used. Hyper-Text-Mark-up-Language (HTML) is used at server and web-based interfaces. Transfer-Control-Protocol/Internet-Protocol (TCP/IP) is used in sending of instruction or “end programs” over such as the Internet to CPE at a user’s end. Serial data transmission is used from such as an Internet host (PC) to a BS such as BS 35 of Fig. 1. RF protocols
20 are used in wireless transmission from a BS such as BS 35 of Fig. 1 to a S/A device such as S/A 37 of Fig. 1. More detail about communication protocols is provided later in this specification.

Fig. 5 is a block diagram illustrating an exemplary wiring relationship between an S/A device 37 and an automated home-system according to an embodiment of the
25 present invention. In this example, S/A device 37 is illustrated as integrated with a watering-system control box 53. The inventor illustrates device 37, in this example, with fewer components than in the example of Fig. 4 in order to save drawing space, however components of Fig. 4 such as MEM 109 and clock 115 may be assumed to be present.

Watering-system control box 53 represents an automated or semi-automated control station or box adapted to control watering of a lawn, garden, or the like and will hereinafter be referred to as control box 53. Control box 53 has a power supply 125 provided therein, which may derive power from a DC source as is typical with most systems of the type, or in any other convenient manner. Control box 53 has an actuator 129 to actuate watering (open one or more solenoid-operated valves, for example) according to a timing switch (not shown) as is generally known in the art. A mode circuitry 123 is provided within control box 53 and represents any additional circuitry or switching present for the purpose of toggling between available modes such as heavy watering opposed to light watering, watering separate portions of a serviced area at separate times, and so on. A precipitation sensor 127 is provided and illustrated within control box 53. Sensor 127 is adapted to sense rain and acts as a feedback mechanism to circuitry 123. In this case, circuitry 123 would have a temporary shut-off mode in case of rain as reported by sensor 127. Although sensor 127 is illustrated as residing within control box 53, in actual practice sensor 127 would, more likely, be externally deployed in some convenient, outdoor location near the area serviced by the associated watering system.

In this example, function actuator 129 of control box 53 is replaced with the function of master actuator 111 of device 37. This may be accomplished by replacing former power-to-actuator and actuator-to-mode lines (dotted lines) with a loop line 131 running from power supply 125 directly to actuator 111 with a return line (131) routed through interface 121 directly to mode circuitry 123 in control box 53. In this way, power supplied to the generic watering system may be used to power actuator 111, which may be controlled by micro controller (MC) 117 according to input from RX/TX section 101. Any timing controls (none shown) generic to control box 53 may also be bypassed in favor of controls provided by device 37.

In another embodiment, actuator 111 may be powered by power supply 119 of device 37 and line 131 may be run from actuator 111 directly to mode circuitry 123 of control box 53 through wiring interface 121. In either case, actuator 129 may be disconnected in this embodiment. In still another embodiment, device 37 may not have

a master actuator such as actuator 111 installed therein but instead, may be adapted to use existing actuator 129 (control box 53) by provision of an overriding control line from interface 121 directly to actuator 129. In this case, MC 117 would be adapted to control actuator 129. There are many possibilities.

5 Mode circuitry 123 in control box 53 may be adapted for control (selection settings) by MC 117 through a control line 133. Precipitation sensor 127 would normally have a reporting line (dotted line) connected to circuitry 123 such that feed back from sensor 127 may be considered in switching modes. However in this embodiment, a reporting line 135 is established from sensor 127 through wiring
10 interface 121 and onto communication bus 99. In this way, precipitation readings from sensor 127 may be reported to and monitored from network level such as at server 27 of Fig. 1.

A temperature sensor 113 is provided with S/A device 37 and connected to bus 99. Sensor 13 is adapted, in this embodiment, as an optional sensor that monitors local
15 temperature day and night, and provides appropriate proportional signals on bus 99. Temperature readings provided by sensor 113 may be considered for use in considering mode selections at circuitry 123. Sensor 113 is optional and may or may not be present. Other types of sensors may also be included within S/A device 37 as may be deemed appropriate for application.

20 It will be clear to the skilled artisan, with the descriptions provided, that there are a variety of ways sensors of the controlled system or appliance, sensors of the S/A device, output signals and actuators of the controlled device, and output lines and actuators of the S/A device may be interconnected to accomplish the monitoring and control purposes of the present invention.

25 In many cases, additional enhancements may be added to a standard home-system such as the above-described watering system controlled by box 53 through adding and integrating components into box 53 that are controlled by and communicate with MC 117. Sensors, switches, mode selections, power-saving modes, and so on may be implemented and controlled by provision of a suitable S/A device
30 and components thereof.

It will be apparent to one with skill in the art that the schema in this example is but one of many methods of integrating an S/A device such as device 37 to a control station or box such as box 53, which in this case controls an existing watering system. There to, are many ways of integrating an S/A device with control circuitry specific to home-electronic appliances. Wiring, bus extension, addition of sensors, switches and like components may be a part of the integration. The inventor intends that such integration should be fairly simple such that one need not be an electrician or engineer to connect an S/A device to a home system or appliance. Using terminal connectors or interfaces such as interface 121 is meant to simplify integration. In practice of the present invention, S/A devices are, in most cases, built for specific systems such that settings, modes, and the like are known in advance thereby facilitating a standard and simple installation. In an alternative preferred embodiment new home-systems and appliances may be provided with built-in S/A devices before purchase.

15 **Remote control operation and settings manipulation**

It is an object of the present invention that a user may be able to enhance and automate existing home systems and appliances for remote control as well as have the opportunity to purchase new systems and appliances already equipped for automation and remote control according to embodiments of the present invention.

Fig. 6 is a process-flow diagram illustrating various logical steps for re-setting or monitoring an automated home-system or appliance from a remote location according to an embodiment of the present invention. At step 131, a user navigates to a specific web page provided by server 27 of (Fig. 1) using an Internet-capable appliance equipped with a browser Interface and a SW plug-in provided according to an embodiment of this invention. Remote locations would include such as mobile unit 17 or remote premise 19 having at disposal laptop 39 and/or PC 21 respectively as qualified Internet appliances.

The term "remote location", as used by the inventor in this example, is intended to denote any location from which monitoring system/appliance status or changing

CPE settings may be performed using any Internet-capable appliance, using such as Internet 11 and server 27 (Fig. 1) to effect any changes. By this definition, PC 33 at user premise 15 of Fig. 1 may be used to “remotely” interact as long as the network-level equipment (server 27 and repository 29) and software are used to aid changes.

5 In remote monitoring and changing of settings, PC 33 acts as an Internet Host (IH) for all requesting remote appliances except in an embodiment wherein a BS such as BS 35 (Fig. 1) is a stand-alone device. In the latter case, PC 33 would not be required in order to practice the present invention. If PC 33 has all of the required software and available data resident at its own facility, then direct off-line monitoring
10 and changing of settings is possible. However, such newly-changed settings would have to be uploaded to server 27 to provide a repository update in order to aid future remote interaction.

At step 133 a user supplies at least a password for authentication of the user to the service. At step 137, server 27 (Fig. 1) extracts user information and status data
15 from a connected data storage such as in repository 29 (Fig. 1) using appropriate DB software.

At step 138 the server displays an interactive web page in HTML format to the user, which appears in the user’s browser window. A user may interact with the service of the present invention through a single interface (Browser). At step 139 a
20 user may make a decision whether or not to leave current settings as they are reported in a status section of the page, or he or she may, if desired, affect changes to such settings. If a user decides in step 139 not to make any changes, he or she may monitor status and then exit (log off) the program at step 140.

If a user at step 139 elects to affect changes to one or more of his or her
25 registered systems or appliances, then he or she may cause a dialogue display to appear at step 141 by clicking on an icon or entering a keyboard command. Such a dialogue display is an interactive software interface equipped with a parsing engine that is adapted to recognize natural language.

In another embodiment such a dialogue display may, instead of using a parser,
30 list all of the user’s active and inactive S/A devices and their associated systems as well

as all available options such that a user may simply check boxes associated with setting changes much like re-configuring a standard software program. All of the user's registered system and appliance data is stored and updated periodically and, in some cases, in real time. Such data is stored in a repository such as repository 29 of Fig. 1
5 and is available in the form of a display page as described in step 138.

In this example, SW running on such as server 27 uses a natural language parsing engine and perhaps one input field for adding data which, after adding, will replace data currently used in existing settings associated with the user's registered home-systems or appliances. At step 143, a user simply types in new settings to
10 replace old settings. In this step, old settings may be displayed for review before a user attempts to initiate new settings. Moreover, a confirmation step (not shown) may exist to insure that a user does not accidentally change settings to one or more home-systems or appliances if not intended. A user enters each setting change along with S/A address, device number, and any other required identification. In some cases, a
15 user may be required to re-enter his or her password for each S/A device for security reasons.

At step 145, a parsing engine used by server 27 parses each entered request and confirms feasibility of each request. There may be specific words and/or symbols that are requested by the service to be included in each request. Such words or
20 symbols known to the parser may represent data required to identify, locate, and describe a S/A device being changed. After all requests are submitted and validated at step 145, a server such as server 27 (Fig. 1) generates a binary command or set of commands, termed an end program by the inventor, at step 147. Such an end program may contain a single setting change for one registered system or appliance, or it may
25 contain many changes to many S/A devices.

At step 149 a server such as server 27 (Fig. 1) sends an end program over such as Internet 11 to a user's identified BS such as BS 35 of Fig. 1 where it is stored for execution. At step 151, an end program reflecting all of a user's desired setting changes is received at his or her BS over such as a serial cable connected thereto and

to his or her PC as in the case of Fig. 1. However, in one embodiment, BS 35 could be a standalone device wherein data is received directly from the Internet.

Moreover, monitoring and initiating setting changes may be performed off-line if a user's PC such as PC 33 is equipped with all of the required software and data storage capabilities. This example assumes, however, that setting changes are performed remotely through such as Internet 11 of Fig. 1.

At step 153, a BS such as BS 35 (termed a "cube" by the inventor) receives and executes an end program downloaded from PC 33 or directly from server 27 (stand alone embodiment). At step 155, BS 35 (cube) broadcasts the appropriate setting changes to the appropriate S/A devices such as device 37 of Fig. 1 using RF technology as taught in the above disclosure. Individual S/A devices pick-up their broadcasts over a 900 MHz (example) channel and execute the appropriate changes to their connected systems or appliances. Also, effected S/A devices may report back to BS 35 the new state of settings for their connected systems or appliances as confirmation of success or failure to initiate. In this way, accurate data may be reported back to such as server 27 for updating data in repository 29 (Fig. 1).

If for some reason, perhaps due to mechanical malfunction or other error state, an S/A device cannot effect a requested settings change, an error report may be immediately sent back to server 27 such that a user may be notified of the particular failure. A user may elect to wait on-line for status confirmation in an embodiment wherein real time reporting is available. Such confirmation does not indicate that settings have actually been activated, as many devices and systems will not actually use the new settings until their next timed interval of operation commences. Therefore, a home-system or appliance does not have to be active to accept setting changes.

At step 157, a new status page is displayed on request of a user after the process is performed and confirmed. Time expiring between step 131 and step 157 may vary, depending on how many S/A devices are changed, and in some cases, the nature of the system or appliance and associated setting changes. For example, BS 35 communicates in half-duplex with S/A devices one at a time. After broadcasting, BS 35 listens for a response from the most recently addressed device. If a response is

missed, the requesting S/A device will retry until it establishes communication. An end program may include all setting changes to all devices therefore some time may be undertaken by a user wishing to change many devices. However, in one embodiment, a dialogue display may offer a program for download that allows a user to configure changes off-line and then re-contact such as server 27 for uploading the finished program. In this way expense of remaining on-line may be reduced.

In still another embodiment, an interactive form-template may be provided as part of a client SW application, which allows a client to first configure changes and then to go on-line to implement them. There are many possibilities. Similarly, SW as described and illustrated in Fig. 1 may be provided many varying capacities to host, remote, and network machines.

It will be apparent to one with skill in the art that the process steps illustrated in this example may vary in order and number without departing from the spirit and scope of the present invention. For example, step 133 may include a step for entering a user name. Step 151 is not required if BS 35 is a stand-alone device. Moreover, there may be additional steps and sub-steps provided. The inventor intends that the example represented herein exemplifies just one of many possible process sequences by which a user may monitor and effect setting changes to home-systems and appliances from a remote location.

Configuring an S/A Device for Operation

Because RF Spread Spectrum technology in one embodiment is used for communication between a BS and a plurality of geographically-distributed S/A devices, there exists a possibility of range overlap regarding adjacent BSs. For example, if neighbors situated in close quarters to each other both are practicing the present invention, their BS ranges may overlap causing a security issue when configuring one or more new S/A devices for service. Therefore, the inventor provides a non-RF apparatus and method for configuring S/A devices for first time use.

Fig. 7 is a perspective view of S/A device 37 of Fig. 1 being configured to BS 35 of Fig. 1 using a magnetic-induction (MI) technology according to an embodiment of the present invention. The shapes shown in Fig. 7 are exemplary only. In a preferred embodiment, BS 35 is a cube having an approximate 6" length, width, and height. S/A device 37 may vary in shape and size according to housed components required for integration to a specific home-system or appliance. As such it may be very small in some implementations and quite larger in others.

It should be noted here that one S/A may, in one embodiment, be adapted to control several like appliances such as, perhaps several smoke alarms. However, it may be more economical to provide each of several smoke alarms with it's own S/A device in order to reduce wiring requirements from an S/A device to distributed smoke alarms.

Referring now back to Fig. 7, device 37 has an on/off power switch 168 to allow a user to power device 37 on or off. Two light-emitting diodes (LEDs) 167 and 169 are similarly provided in a convenient and visible location on the outside casing of device 37. LED's 167 and 169 are functional display lights used during a magnetic induction (MI) device configuration process.

BS 35 is equipped with a power on/off switch 164 and two LEDs 161 and 163 as described for device 37. As with device 37, LED's 161 and 163 are used during MI configuration. Magnetic induction (MI) is a process known in the art to be useful for transferring binary data through electrically generated magnetic coded pulsing. In this case, device 37 and BS 35 each have a magnetic sensor and a coil through which electric current is passed to create a magnetic field. In device 37 the sensor/coil implementation, known as a coil/sensor driver, is represented by element number 165. The coil/sensor driver illustrated in BS 35 is represented by element number 159. In this case, binary transfer is bi-directional. That is, certain data held in BS 35 is transferred to device 37 and certain data held in device 37 is transferred to BS 35 during one configuration process as illustrated by the four dotted arrows labeled binary data transfer.

In one embodiment, device configuration via MI technology is one-way communication from BS 35 to device 37. That is to say that all of the device information required to activate device 37 to the service is provided by BS 35. In this case, device 37 would not require a coil but only a magnetic sensor (magnetometer).

5 Magnetic fields operate typically in this fashion over a very short distance, depending largely on the frequency and power used, and the apparatus in this case is made for short coupling. A user must power on device 37, and bring it close to BS 35 while BS 35 is powered-on. BS 35, by way of coil/sensor driver 159, transmits its digital information by means of applying a baseline field (created by passing a current through

10 the coil). The baseline field is modulated in amplitude to code the bits needed for a binary programming sequence.

In this embodiment, the inventor allows for a possibility that device 37 may have data, perhaps supplied by the device manufacturer, that is required to be transferred to BS 35 as part of the configuration process. Therefore, MI technology as

15 illustrated herein has bi-directional capacity. For example, a user wishing to configure device 37 brings device 37 within an acceptable distance (D) to the proximity of BS 35. Distance D should be less than a foot and both device 37 and BS 35 must be powered on. Assuming that first device 37 will transmit data, then one LED such as LED 167 will light (can be any color) indicating the beginning of data transfer. When

20 device 37 is finished transferring it's data, LED 169 will activate indicating such.

LED 161 on BS 35 will then activate, indicating the beginning of it's data transfer to device 37. When BS 35 is finished transferring it's data, LED 163 will activate indicating a completed bi-directional process. Device 37 is, at that point, configured to BS 35 with BS 35 configured as master and device 37 configured as

25 slave. In this way, sensitive information such as binary keys and the like would not be broadcast via RF and could not be intercepted by way of eavesdropping.

In an alternative embodiment an initiation button or switch is provided on one or the other (or both) of the BS and the S/A device, and an initiation process is performed each time an initiation signal is sent by the button or switch, as long as both

30 devices are on and the devices are within the required range.

The method described above will not only relieve users of the need to set dip-switch settings after they purchase a new device, but will also allow every device in use to have a unique address that can be tracked and manipulated from such as server 27 of Fig. 1. The above-described method also facilitates waterproof casing designs for devices that need to be placed out-of-doors. Magnetic fields will permeate both non-magnetic metal and plastic housings such that a user is not required to open a device to expose any connectors or circuitry.

In practice of the present invention, there may times when it is not practical to bring an S/A device near a BS for configuration. An example would be that of an already mounted and wired S/A device sold with a new home-system such as a heating and air conditioning system. Disconnecting such a device in order to program the device through the MI process may be inconvenient for a user. Therefore, the inventor provides a hand-held proxy device (not shown), which may be battery powered and capable of obtaining data from a BS such as BS 35 and transferring it to an S/A device such as device 37 by proxy. The proxy device in this has the MI apparatus and system and sufficient memory to store data from either until brought near the other and then activated again.

Addressing Protocol Between Server and BS

Device identification and addressing data is required for configuring a device 37 to a BS. Data requirements for enabling an S/A device to practice the present invention may include but are not limited to a user number #, a device-type indicator, a device #, I/O actions and status indicators, and device data indicators.

It is presumed in this example, that data about a new S/A device is already known to the service before its connection and configuration to a BS. Such data, which will be described below, may be stored in a repository such as repository 29 of Fig. 1 and transferred in an address field to a requesting BS during configuration of an S/A device and during normal operation. However, during normal operation all data fields in the address may not be utilized. In one embodiment, such data contained in

the address field may be transferred to a BS before an anticipated configuration process.

A user number in a preferred embodiment is a 32-bit security number generated by such as server 27 of Fig. 1 from a mathematical combination of a user's name and
5 password. Therefore no two user-numbers will be the same. Neither will user numbers be sequential, thereby enhancing security during RF transmission. A user number is encrypted with other data included within a device address field and sent to a BS from a server. A user number is transferred from a BS to an S/A device during MI programming and not by RF transmission. A user number allows devices to know
10 who their master BS is, such that they do not respond to a wrong BS.

A device type is a 32-bit classification of a device such as device 37. This classification tells whether a device is, for example, in a designated "functional class" of devices, a "manufacturer's class" of devices, or a revision-level sub-class of either one of the former classes in stand-alone version or in combination with each other. It
15 will be apparent to the skilled artisan that there are many possible classification schemes that may be attributed to devices such as device 37.

A device # is in a preferred embodiment an 8-bit number designating a particular index number of a given device under command by a particular BS such as BS 35. For example, if there are three smoke alarms controlled by one BS then each
20 S/A device associated with each alarm would be sequentially numbered such as device 9, device 10 and device 11. There can be up to 256 devices under command by a single BS since their numbers are contained within an 8-bit field.

Device data in a preferred embodiment is a 16-bit field of the address that contains data from the device to be sent to a BS, as well as programmed flag or
25 threshold indicators from the BS for device re-setting (used in normal operation). For example, this section may contain the numeric reading of a value derived from an altimeter in a reporting sense from the device to the BS. This section could also be used to trigger an event should a connected temperature sensor indicate a temperature state above a pre-known threshold. This data is encrypted during subsequent RF

transmission to devices using the well-known XOR encryption technique as described above.

I/O actions and status indicators are contained in a 16-bit field of the address. Such indicators identify all of the command data and status conditions of a particular device in terms of inputs, outputs and actions. These indicators are catalogued and maintained for all configured device-types at network level such as in server 27 of Fig. 1. Binary command data-sets (pseudo code) are developed by the service provider along with a manufacturer of a home-system or appliance which an S/A device is intended to compliment. For example, if a particular manufacturer provides a washing machine that is to be connected and registered as a home-appliance to the service, then that manufacturer and a manufacturer of an associated S/A device may agree that the particular washing machine will utilize certain modes. These modes may include but are not limited to a standard wash cycle, a standard rinse cycle, a super wash cycle, and a standard spin cycle along with standard power on and off modes. A list of created command codes is transferred to a target S/A device during the MI programming sequence. Subsequent user-initiated commands are transmitted via RF during normal use. In some cases, an S/A device may also be programmed via RF as long as the data is not sensitive as is a user number. Therefore, command lists may be transferred via RF as opposed to MI.

Once it is decided which modes will be available for remote monitoring and control, they are assigned individual binary codes that are contained in the 16-bit I/O actions and status field from which a BS issues specific commands that would employ these selected modes as described above. It should be noted here that some modes of a home system or appliance might be selected for remote control and monitoring while others will not. In some cases, all available modes to a system or appliance may be included. Such consideration depends on the system or appliance type and practical application.

The I/O actions and status indicators and device data indicators included in an address field for a given device are encrypted by XOR-ing the actual command bits in with an assigned user number. The user number is pre-programmed during the MI

process described above and is never transmitted over the air (RF). Therefore, a user number cannot be intercepted by an unauthorized user operating an adjacent BS.

Moreover, the above technique solves any BS conflicts that may otherwise arise from two devices belonging to two separate systems sharing a same ID number. During RF transmission between a BS and a S/A device, a cyclic reduction control (CRC) error correction method of 16-bits is used to insure all data is received by an S/A device during transmission.

Each and every device such as device 37 is assigned a unique ID number by such as server 27 of Fig. 1 and not a device manufacturer. This eliminates any possibility that a device can cause serial number labeling errors during the manufacturing of the device, and furthermore, will allow any server-generated ROM upgrades to be controlled. Each device also has an encryption key for decrypting RF data.

Fig. 8 is a process flow diagram illustrating logical steps for configuring a new S/A device to a BS according to an embodiment of the present invention. In step 171, a user registered to the service logs-on to the service through an Internet appliance such as PC 33 of Fig. 1. SW provided as a plug-in to a browser interface enables smooth and seamless operation and interaction.

At step 173, a status web page is displayed in a user's browser window. Such a page allows a user to monitor already-registered and active systems or appliance operations, initiate and effect setting changes, and to configure a new S/A device or devices to the service. At step 175, a user selects (via mouse click or keyboard entry) an option to configure a new device. It is assumed here that in this step, a user enters an authentication number for the device to be authenticated and identified at such as server 27 of Fig. 1.

In an another embodiment, such authentication may be automatic during a first step of a MI programming sequence. In either case, authentication must be performed in order for a server such as server 27 of Fig. 1 to obtain the standard data stored for a particular device. In this example, as will be evidenced by the order of steps 181 and 183, authentication is performed manually by data entry. Authentication of an S/A

device should not be confused with a user number given to the device for the purpose of teaching the device which BS to respond to during RF transmission.

An S/A device may be, in some embodiments, a universal device adapted for more than one standard home-system of appliance. As such, authentication would be
5 required if such a device is purchased “dumb” and then enabled by a server through field programming. In this respect, authentication allows the server to find the data listed under the authentication number. At that point, a user may select which data to download for the particular implementation of the device.

At step 177 a server such as server 27 of Fig. 1 retrieves or obtains device
10 parameters specific to the particular device to be programmed based on receipt of authentication. Such data may be held in such as repository 29 of Fig. 1 or any other connected data store adapted for the purpose. At step 179, the device parameters are downloaded to the commanding BS such as BS 35 of Fig. 7 (cube).

At step 181, a user powers on the device targeted for programming if not
15 already done in a first step for MI authentication in the event a user relies on the device to authenticate itself and does not manually enter authentication data. At step 183, a user brings the target device near the commanding “cube” if not already performed as described above. At step 185, a user waits for an LED sequence associated with MI programming to complete. At step 187, the target device is configured to the service
20 and ready for normal use. After completing step 187, a user may set initial settings for a target device by such as the method described in Fig. 6.

Steps 181 and 183 may be performed before step 177 if device self-
authentication is possible. If not, then it is assumed authentication is made through interaction with a host computer such as PC 33 of Fig. 1. Such data entry would be
25 performed in step 175 as described above.

It will be apparent to one with skill in the art that the process steps illustrated herein may be of differing order and description without departing from the spirit and scope of the present invention. For example, steps 181 and 185 may be performed before step 177 as described earlier. An automated device-authentication step may be
30 practiced such that it is not part of a main MI programming sequence. For example,

by powering on both a S/A device and a BS, bringing them close together, and depressing a button on a target S/A device, a separate unidirectional MI sequence may take place that transfers authentication from a device such as device 37 to a BS such as BS 35, at which point, the authentication data or key would be uploaded to a server
5 such as server 27 allowing step 177 to be initiated. There are many possibilities.

Inter-Business to Client Relationship

According to a preferred embodiment of the present invention, a service
10 provider, defined herein as a company which provides and maintains the service of the present invention, including provision and maintenance of the novel communication equipment and architecture enabling the service as taught in this specification, maintains control and direction of other participating entities through licensing of the technologies used for enabling a communication network used in the service, and also,
15 through licensing of system and appliance manufacturers to create and provide new systems or appliances that use the methods and apparatus of the present invention. Therefore, a unique inter-business relationship is created and refined to that end. Such an inter-business relationship and its effect on a common customer-base is described below.

20 Fig. 9 is a block diagram illustrating a functional business relationship between various entities providing service and/or equipment and their relationships to a common customer base according to an embodiment of the present invention.

In the following example, the inventor illustrates a model describing a functional business model envisioned to exist between a provider 193 and participating
25 entities, illustrated herein as a chip manufacturer 189, and various original-equipment-manufacturers (OEM's) 191, which may, through agreement, be pre-disposed to adopting the methods and apparatus of the present invention.

Provider 193 includes a service/equipment supplier 195, which may be a division of provider 193. Provider 193 is the author of the described method of
30 practicing the present invention and controller of proprietary apparatus required

practicing the present invention. Service/equipment supplier 195 then would be a customer-interface arm of provider 193. Provider 193 controls internal production and distribution of sensor/actuator devices 197.

Chip manufacturer 189 supplies provider 193 with the required RF
5 communication chip-sets for BS and S/A device implementation. In one embodiment, special RF chip-sets may be developed by provider 193 instead of being purchased. Such chip-sets would be designed to enhance the practice of the present invention. Such RF chip-sets would not require some of the circuitry or technologies used in telephony applications for which RF chip-sets are mainly intended. Manufacturer 189
10 may be any one or number of suppliers chosen by provider 193.

Service/equipment supplier 195, which is part of or a division of provider 193, uses various selected suppliers and it's own manufacturing and assembly facilities (not shown) to build and/or modify integral pieces used in practice of the present invention. For example, BS systems may be acquired from a supplier and then modified to
15 practice the present invention. S/A devices are, at least, initially assembled at the location of provider 193 using parts that are proprietary to provider 193 such as some sensors, circuitry and so on. Assembled S/A devices 197 are produced by supplier 195, which is a division of provider 193 as illustrated by a directional arrow emanating from supplier 195 and progressing toward devices 197.

20 Service/equipment supplier 195 provides service through the Internet to customers represented herein by an illustrated customer base 199. This is demonstrated by a directional arrow labeled "CPE/service portal". This portal, which uses the Internet as a conduit, represents a data-communication interface from provider 193 to all customers 199. Customers 199 may purchase equipment, obtain
25 technical service, and monitor their home systems and appliances through the above-described portal.

In one embodiment, a CPE/service portal may also include an "OEM conduit for advertising". More detail about OEM advertising to customers is provided below.

Some of devices 197 are used for retrofitting to existing customer-owned
30 home-systems or appliances such that they may be included in practice of the service of

the present invention. Some devices are supplied to OEM's for inclusion into new systems or appliances. Using devices supplied by provider 193, OEM's 191 may provide new systems and appliances equipped to practice the present. Such new systems or appliances purchased by customers would include software and instruction
5 for registering with the service of the present invention.

By providing devices directly to customers for retrofitting to existing systems and appliances and by providing devices to OEM's for integration in to new systems and devices available to consumers, provider 193 may effectively control both markets for RF enabled home systems and appliances.

10 In many cases, universal S/A devices may be offered that may be configured to more than one single system or appliance or more than one brand of such appliances. For example, provider 193 may market such a device that may be configured to a variety of "makes" of like appliances such as, perhaps, several different brands of washing machines as well as the same brands of dishwashers. In this way, a user may
15 swap one S/A device from a washing machine to a dishwasher if so desired. Device programming would be re-flashed with new instruction from such as server 27 of Fig. 1 when configuring for the latest appliance. Extra wiring terminals on such devices would allow for more or fewer wiring connections as may be required with different appliances. Such standardization may be practiced at least on a limited scale.

20 Device data and development parameters and rules for new S/A devices may be developed jointly by provider 193 and any participating OEM 191. For example, S/A programs (flashable firmware) developed for new "dumb" universal devices provided to an OEM for redistribution or manufactured by the OEM for direct sale through license are sent to provider 193 (if developed by the OEM) and stored in such as
25 repository 29 of Fig. 1 where they may be accessed during customer configuration of a "dumb" device to an actual system or appliance. In this way, new device parameters are known before customer purchase.

In another embodiment, device parameters and instruction programs required for a device to control a system or appliance may be included with the device at sale
30 such that only configuring the device for radio addressing and communication on the

network is required. Devices that are sold “smart” or already having parameters and instruction included may still be erased and re-programmed with server held instruction if the device is adapted as a universal device.

5 **Conduit for Direct OEM Advertising**

Referring still to Fig. 9, Provider 193 may, under agreement with OEM's 191, provide an Internet conduit through portal services for OEMs to advertise their products and services to customers 199. For example, when registered user's log-on
10 to monitor or change settings to various registered systems or appliances, streaming ads may be sent to them by OEM's offering RF-equipped systems or appliances and services. Such advertisement may be caused to appear in a same web page used by a customer 199 to configure, monitor, or change settings. The ability to purchase products and services offered by provider 193 and any authorized OEM's 191 directly
15 from a customer's interface may also be provided.

Rules dictating the method, intensity, and which OEM's may advertise to which customers 199 may be controlled by provider 193. For example, if a customer already uses systems or appliances specific to a particular OEM 191, then that particular OEM may enjoy an exclusive conduit for advertising updated systems,
20 service, and additional products that a customer 199 has yet to purchase. If a customer has systems or appliances specific to more than one OEM, then competition may be encouraged such that a customer may compare pricing and service. The opportunity for such direct advertising may be an incentive for OEMs to equip new systems and appliances with S/A devices supplied by provider 193 or manufactured by
25 the OEM by virtue of license. There are many possibilities. The business model represented herein by Fig. 9 can be summarized and standardized as follows:

- 1) A provider offering and maintaining the service and CPE of the present invention sells equipment, software, and service to clients wishing to automate and remotely control home systems and/or appliances.

- 2) The provider, through agreement with various OEMs supplying systems and appliances that may be adapted to practice the present invention, supplies equipment, software, and licensed technology such that the OEMs may create and offer new systems and appliances to a common customer base.
- 5 3) Customers acquiring new RF-equipped systems or appliances from OEMs register such equipment and appliances with the service provided by the provider.
- 4) OEM participation rises naturally as a result of a growing customer base already practicing the present invention, and concertedly through incentives which include an Internet-based conduit for direct advertising to service-registered
10 customers.
- 5) OEM's through agreement with home building contractors may create and supply new "Smart Home" systems using RF capability instead of mass cabling structures wherein such systems and components thereof may be of one manufactured source through licensing by the provider.

15 It will be apparent to one with skill in the art that the method of business described above may be tailored somewhat by design and purpose of a provider without departing from the spirit and scope of the present invention. However, in a preferred embodiment, the provider shall maintain control over servicing clients through such as an Internet portal-interface and any OEM advertising activities
20 allowed through such a portal. Licensing to OEM's of technologies and rights to manufacture may be separately negotiated with each OEM without departing from the spirit and scope of the present invention.

In many cases such OEM's will not be natural competitors to each other such as might be the case with two or more OEM's manufacturing like products. For
25 example, a lighting system manufacturer and a watering system manufacturer would not compete for business. In situations where two or more competing OEM's are licensed by the provider to manufacture RF-equipped systems or appliances, the provider may encourage natural competition by allowing both OEM's to advertise directly to customers through the portal maintained by the provider.

System Planning, Control and Implementation Service

The present inventor is aware that there are a number of existing home monitoring systems and protocols on the market at the time this patent application is submitted. These are largely hardwired systems, and typically communicate in the home or business with a home station or base station, such as a PC. In some cases these systems communicate by special wiring, in others communication is imposed over the local power wiring, and so on. In each of these proprietary systems the way control and sensor units interface to various systems and appliances is different, the communication with a central control is proprietary, and, in most cases, there is no ability to monitor and control the home or business-based systems from a remote location, such as by interfacing through a customized Internet page, as described above in embodiments of the present invention.

The present inventor is aware, as well, that many such systems have been implemented in homes and businesses, and that the owners and users of most such systems have no Internet access and control for their systems. It is an object of the invention to provide a way to access and control such existing systems via the Internet.

The inventor is aware as well that there are many potential customers for home monitoring and control systems who may hesitate to purchase and implement such systems because there is little reliable information as to which systems and protocols may better serve under what circumstances, little comparative pricing information, and very little information available for planning, installation aid, debugging, and troubleshooting such systems. It is a further object of the present invention to correct this lack, and to provide an Internet-based service through which a client may plan and build a virtual system, selecting from a broad variety of commercially available equipment; may then purchase the necessary units and components through the same service, and then may rely on the service as well to guide the client through installation, testing, and debugging; and then may activate and access and interact with the resulting system both locally and remotely, as described above.

For the case of a client having an existing, working, and installed home system, the present inventor provides, through server 27, a system wherein the client may build a personalized home page on server 27 to interface with his or her installed and working system. The working of this service may be described with reference to Fig.

5 1.

In this embodiment it may be assumed that the client at user premise 15 has an existing and working system represented generally by base station 35 and S/A units 37. In this case the apparatus of the S/A appliances may vary widely, and there may or may not be a base station 35. In the existing system the S/A units may communicate
10 directly with PC 33, for example. In any case, the protocol and PC interface for sensing and control for the existing system will be known and will conform to some manufacturer's proprietary protocol.

In this embodiment, the client may access a special page at server 37 for creating an Internet-based control interface for his/her existing system. In the process,
15 after registering with the service and making initial arrangements, the client is offered a configuration interface, allowing the client to enter the manufacturer's name and perhaps model numbers of the existing system; and the number and nature of local controlled appliances and systems. The offered service at server 27 has pre-programmed information and data for as many commercially-available systems as
20 practical.

In the creative process the client is guided step-by-step, and creates monitoring and control interfaces for each appliance and local system, which are stored and accessible in a client's personalized page. In most cases the client is then provided with (downloaded to the client) a software interface for the client's PC, which interfaces
25 with the local system's existing software on the client's PC. Once the provided software is installed and initialized, this client can thenceforth access his/her page at server 27 from any Internet-capable appliance and interact with his/her home monitoring and control system, just as described above for systems according to other embodiments of the present invention. Thus clients having existing systems are
30 accommodated and served in embodiments of the present invention.

In a further embodiment, for those persons (potential clients) who do not have an existing system, a service is provided through server 27 for virtual creation of a home system, and then for purchase, installation, testing, and so forth.

In this embodiment a client indicating a desire to create a virtual home system, after suitable registration and the like, is offered a graphic interface wherein the client may browse existing hardware and protocols, and the like, and become familiar with what is offered. This client may then enter, using existing templates in many cases, the nature and characteristics of the home appliances and other systems the client may wish to monitor and control.

As an example, this client may enter particulars about an existing heating and air-conditioning system, and identify S/A units available that may be physically interfaced to the heating and air-conditioning system. The client may then select an appropriate S/A unit and configure a monitoring and control interface for the resulting virtual unit. Similarly the client may browse for commercially-available video monitoring and other security equipment, and select such equipment as well for inclusion in the new virtual system. In like manner the client may continue to create a complete virtual system for the home or system.

When the virtual system is complete, the client may practice with the personalized interface resulting and become familiar with the operation and control characteristics of the overall system. Once the client is ready, the system at server 27 will create an entire bill-of-materials for the system, lead the client through pricing and the like, and the client may then order, in most cases, all the necessary equipment and paraphernalia necessary to implement the system. A project is then opened for the client. When the equipment arrives at the client's premise, complete instructions and guidance is made available through the client's personalized page at server 27 to guide the client in installation, activation, and testing for all of the equipment and systems at the client's premise.

Once installation is complete, in a preferred embodiment the client is further provided with testing and debugging guidance and procedures, and once the system at

the client's premise is operable and tested, the client may then operate either locally or through the Internet as in other embodiments described above.

It will be apparent to one with skill in the art that the method and apparatus of the present invention may be practiced on the Internet or other suitable data-packet or other high-speed, broad band data network without departing from the spirit and scope of the present invention provided correct transfer protocols are used and supported. Moreover, the method and apparatus of the present invention may be adapted for both home and business use. There will also be a broad spectrum of users who have varying degrees and levels of home automation in place, and it will also be apparent to one with skill in the art that all the concepts presented herein will be as useful to the novice as they will be to the expert. Any premise, including mobile platforms, that may have systems or appliances stationed therein with such systems and appliances being configurable to device, system, and service of the present invention may be included under the scope of the present invention.

15

Application to Vehicles

In a further embodiment of the present invention the principles and functions of this invention taught in other embodiments above are applied to vehicles, such as personal automobiles and commercial cars and trucks. In this embodiment S/A units are provided and integrated with components of the target vehicle, such as the engine, the transmission, the gas tank, the speedometer and odometer, and so forth. In this embodiment the sensing aspects may be ascendant, as it makes little sense to control a vehicle's speed, for example, from a remote location.

Using a vehicle as an analogy to the home or business location as used in exemplary embodiments above, essentially all of the functions described in the other embodiments may be applied in one form or another, and it will be apparent to a skilled artisan, given the many embodiments described above, how this may be done.

30

Video Capture and Control

5 With a centralized home automation web site as taught in several embodiments of the present invention described above, a video capture and control capability service is provided in a further embodiment. In this embodiment the user sets up a small CCD (or other digital camera) system and hooks it up to a digital capture and conversion box, then video info (single or multiple frames) is captured and uploaded to the web
10 site of the subscription service for storage and review. Several add-on services are then provided by the service, using the captured and stored images. For example, in one embodiment the service monitors new images and compares them to recently acquired images, or at least the last image received. If an image does not change, no action is taken, but if the image changes, an alert is generated for the user. The user
15 may be paged, telephoned, or alerted in another manner, that an image has changed.

 Also, there are many other useful algorithms that can be run from the web site once target systems are in place at the user's home or business. For instance, if the user has a watering system, then the web site can tap into macro weather information (available on the web) and automatically adjust their watering times to conserve water
20 and optimize grass or plant health. In this particular case, there is an algorithm that somebody has already developed that saves a user up to 57% of their monthly water usage and additionally yields healthier plants within this overall conservation.

 It will also be apparent to the skilled artisan that there are many alterations that might be made in embodiments described without departing from the spirit and scope
25 of the invention. For example, in the service described above wherein a client may create a virtual system through an Internet interface, there are a broad variety that the needed graphic interfaces may take. The detailed nature of these interfaces, using known operations and icons and the like, are not limiting in the invention. There are similarly a broad variety that home control and monitoring systems may take, and
30 many ways the unique functions of embodiments of the invention may be programmed.

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Therefore, the method and apparatus of the present invention should be limited only by the claims that follow.

What is claimed is:

1. A control unit to facilitate remote programming for local control of systems and
5 appliances, comprising:
 - a microcontroller for managing functions of the control unit;
 - an input-output (I/O) section coupled to the microcontroller for interfacing
voltage levels between the systems and appliances and the microcontroller;
 - a system memory for storing executable code and data;
 - 10 a wiring interface for connecting input and output points from the control unit
to the system or appliance; and
 - an RF section communicating with the microcontroller and memory for
receiving programs and data;
 - characterized in that, with connections made between the wiring interface and
15 the controlled system or appliance, the microcontroller provides outputs to operate
functions on the system or appliance in response execution of control code and stored
data by the microcontroller, the control code and data received via the R/F section.
2. The control unit of claim 1 wherein the microcontroller produces control outputs
20 partly in response to input from sensors on the controlled system or appliance.
3. The control unit of claim 2 further comprising additional sensors in the control unit,
wherein the microcontroller produces control outputs partly in response to input from
the additional sensors.
25
4. The control unit of claim 1 wherein the microcontroller monitors sensors, whether
internal or on the controlled system or appliance, and transmits status data via the RF
section.
- 30 5. A method for controlling a system or appliance, comprising steps of:

(a) connecting a control unit to the appliance by a wiring interface, the control unit comprising a microcontroller for managing functions of the control unit, an input-output (I/O) section coupled to the microcontroller for interfacing voltage levels between the systems and appliances and the microcontroller, a system memory for
5 storing executable code and data, a wiring interface for connecting input and output points from the control unit to the system or appliance, and an RF section communicating with the microcontroller and memory for receiving programs and data;

(b) receiving control code and data from a remote location by RF signals via the RF section; and

10 (c) operating functions on the system or appliance in response to execution of the received control code and data by the microcontroller.

6. The method of claim 5 wherein, in step (c) the microcontroller produces control outputs partly in response to input from sensors on the controlled system or appliance.

15 7. The method of claim 6 further comprising additional sensors in the control unit, and wherein, in step (c) the microcontroller produces control outputs partly in response to input from the additional sensors.

20 8. The method of claim 5 further comprising a step (d) for monitoring sensors, whether internal or on the controlled system or appliance, and transmitting status data via the RF section.

25 9. A base station for managing one or more control units, comprising:
a microcontroller for managing functions of the base station;
system memory coupled to the microcontroller for storing executable code and data needed in base station functions;
a communication port for communicating with the Internet; and
30 an RF section;

characterized in that the base station receives control code and data via communication port, and transmits the control code and data via the RF section to the one or more control units for use in controlling systems and appliances.

5 10. The base station of claim 9 wherein the communication port is one of a standard serial or parallel communication port compatible with a personal computer (PC) and wherein the PC handles communication with the Internet for receiving control code and data, and transfers the control code and data to the base station.

10 11. The base station of claim 9 wherein the base station records and identifies all remote control units in its range, and selectively transmits data and control code to the control units via the RF section, the incoming control code and data being identified for individual ones of the control units.

15 12. The base station of claim 9 enabled to identify and communicate with up to 256 control units selectively.

13. The base station of claim 9 wherein the base station receives status data via the RF section from control units, and transmits the status data identified according to the
20 control unit providing the status data, to the Internet.

14. A method for managing control functions for a plurality of systems and appliances in a home or business area, the systems and appliances connected to control units having each an RF section for receiving control code and data and transmitting data,
25 the method comprising steps of:

 (a) identifying each control unit uniquely electronically;

 (b) providing a single base station in the home or business area, the base station having a port for communication with the Internet and an RF section for communicating with the plurality of control units; and

(c) downloading control code and data from an Internet site by the base station identified for individual ones of the control units, and transmitting the downloaded control code and data selectively to the individual ones of the control units.

5 15. The method of claim 14 wherein, in step (c), the base station also receives status data from the control units identified as to the control unit sending the data, and forwards the status data to the Internet site.

10 16. The method of claim 14 wherein the communication port is one of a standard serial or parallel communication port compatible with a personal computer (PC) and wherein a connected PC handles communication with the Internet for receiving control code and data, and transfers the control code and data to the base station.

15 17. A control system for systems and appliances in a home or business area, comprising:

a plurality of control units wired to sensors and actuators of individual ones of the systems and appliances, the control units having each a microcontroller, a system memory and an I/O section, and an RF section for external communication;

20 a base station in the home or business area having a communication port to the Internet and an RF section for communicating with the plurality of control units; and an Internet site executing software enabling a subscriber associated with the home or business area to interact with the base station;

25 characterized in that the Internet site software provides an interface for the subscriber to review status of systems and appliances having connected control units in the associated home or business area, and to enter control code and data addressed for individual ones of the control units in the home or business area.

18. The control system of claim 17 wherein the base station comprises an Internet browser and an Internet-capable port for Internet access.

19. The control system of claim 17 wherein the base station has a standard serial or parallel port for connection to a personal computer, and the personal computer accomplishes necessary Internet browsing functions.

5 20. The control system of claim 17 wherein each control unit is configured to the base station by a specific address.

21. The control system of claim 17 wherein the subscriber has a specific web page on the Internet site, wherein all configured, installed and active control units in the home
10 or business area with which the subscriber is associated are indicated.

22. The control system of claim 21 wherein the base station, through the respective RF sections, configures any new control unit brought into the home or business area by adding the control unit to a list managed by the base station, including assigning the
15 control unit an address, and communicating to the associated web site details regarding the new control unit in a manner that the subscriber may monitor and control the system or appliance associated with the new control unit through the web site.

23. The control system of claim 21 wherein the base station, through compatible
20 magnetic induction equipment installed in both the base station and any new control unit, configures any new control unit brought within a maximum induction range by adding the control unit to a list managed by the base station, including assigning the control unit an address, and communicating to the associated web site details regarding the new control unit in a manner that the subscriber may monitor and control the
25 system or appliance associated with the new control unit through the web site.

24. A method for managing control functions for a plurality of systems and appliances in a home or business area, comprising steps of:

(a) connecting a control unit to each system or appliance, each control unit
30 enabled to receive input from sensors and to actuate functions of the system or

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appliance to which it is connected, with each control unit having an RF section for receiving control code and data and transmitting data;

(b) identifying each control unit uniquely electronically;

(c) providing a single base station in the home or business area, the base station
5 having a port for communication with the Internet and an RF section for communicating with the plurality of control units;

(d) downloading control code and data from an Internet site by the base station identified for individual ones of the control units, and transmitting the downloaded control code and data selectively to the individual ones of the control units; and

10 (e) providing a web site where a subscriber associated with the home or business area may access a web page having an interface for displaying status of each active control unit in the home or business area, and allowing the subscriber to enter functions and data for controlling the active control units in the home or business area.

15 25. An Internet subscription service having a system comprising a plurality of web pages specific to individual subscribers, and accessible interactively by the subscribers through any Internet appliance;

characterized in that the system communicates for each web page and subscriber with a base station at a home or business site associated with the subscriber,
20 wherein individual base stations stream status information regarding systems and appliances at the home or business site to the web site for posting on the associated web pages, and commands and data entered by a subscriber in a web page for a specific site are streamed to the base station at the home or business site.

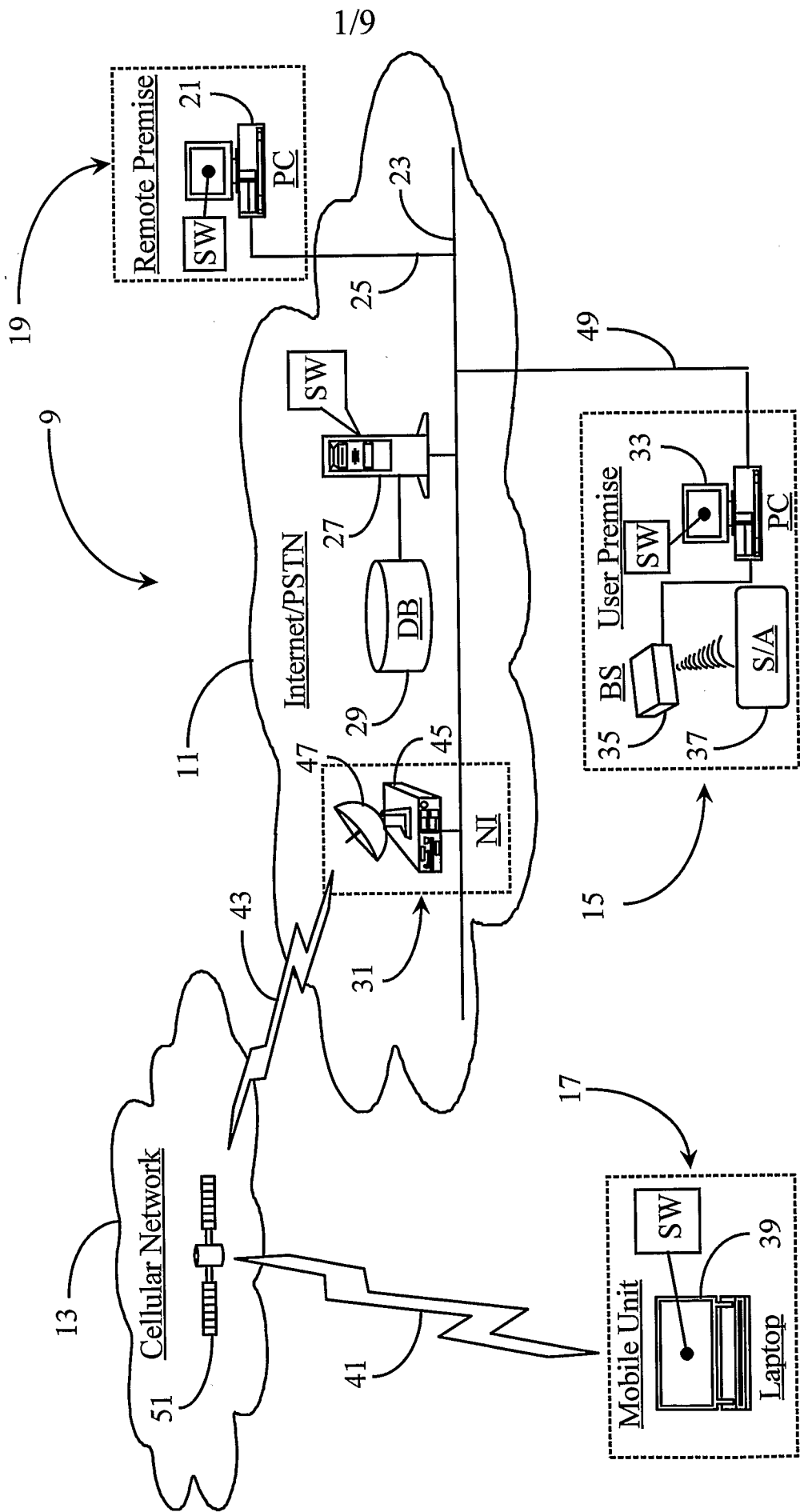


Fig. 1



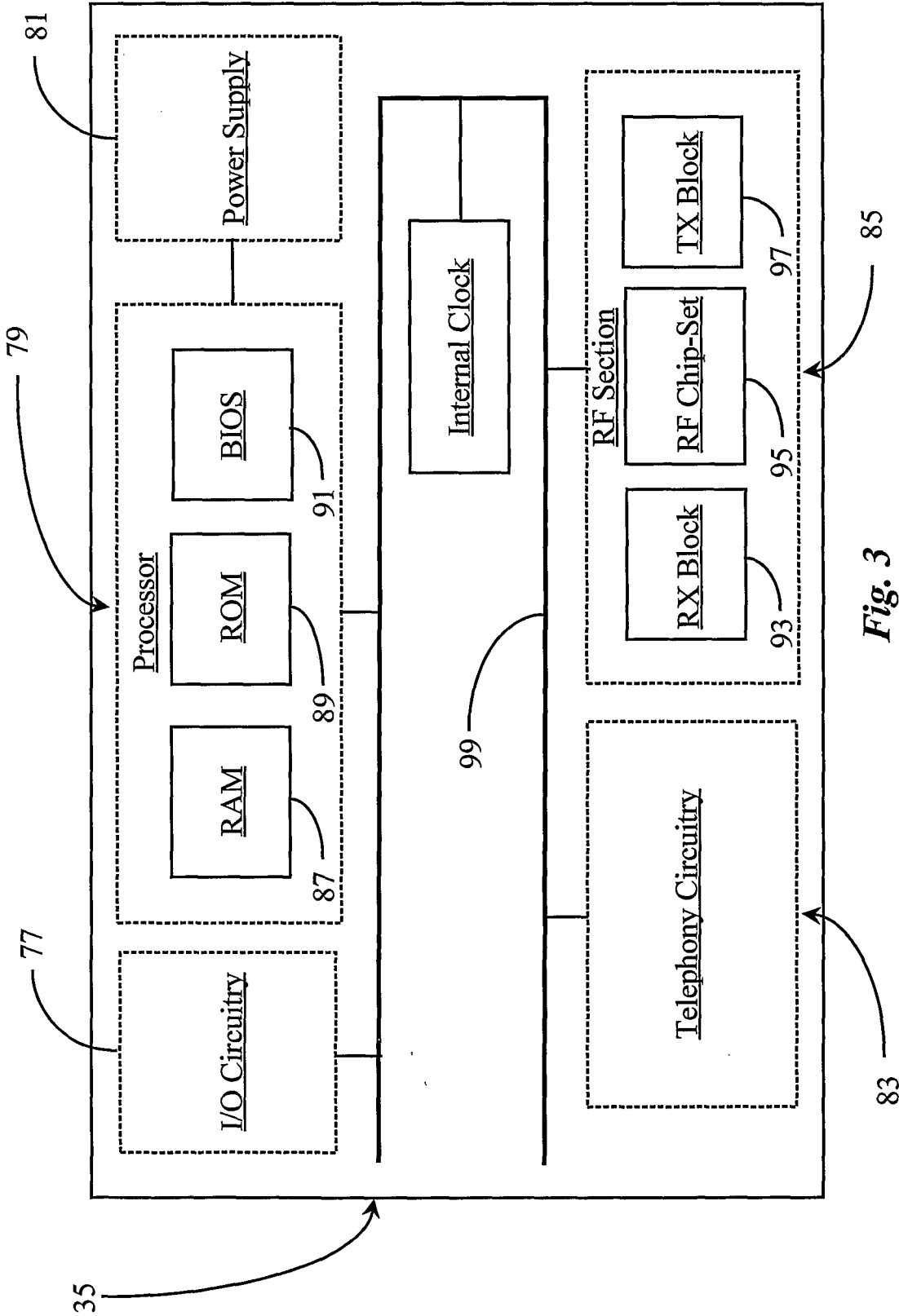
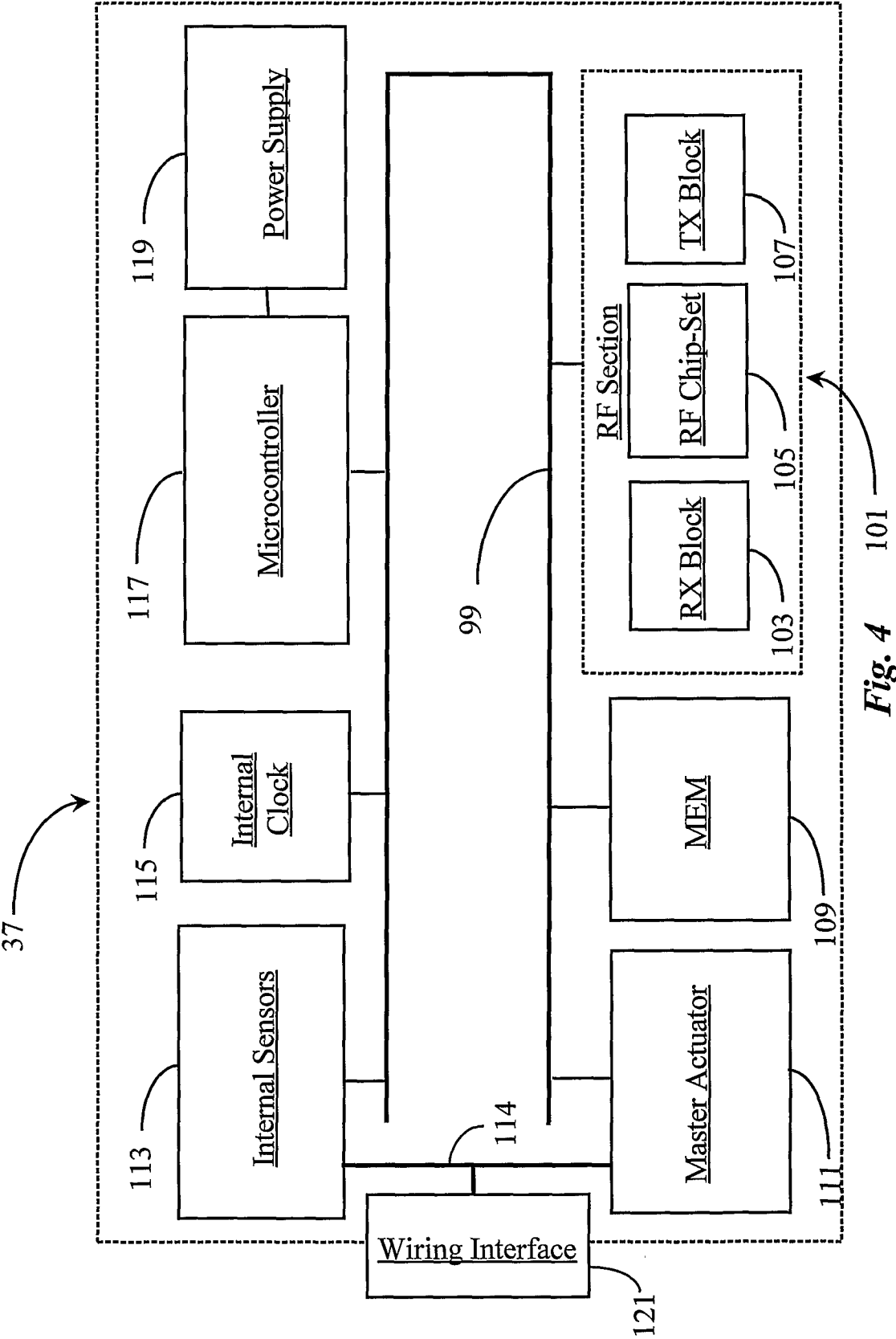


Fig. 3



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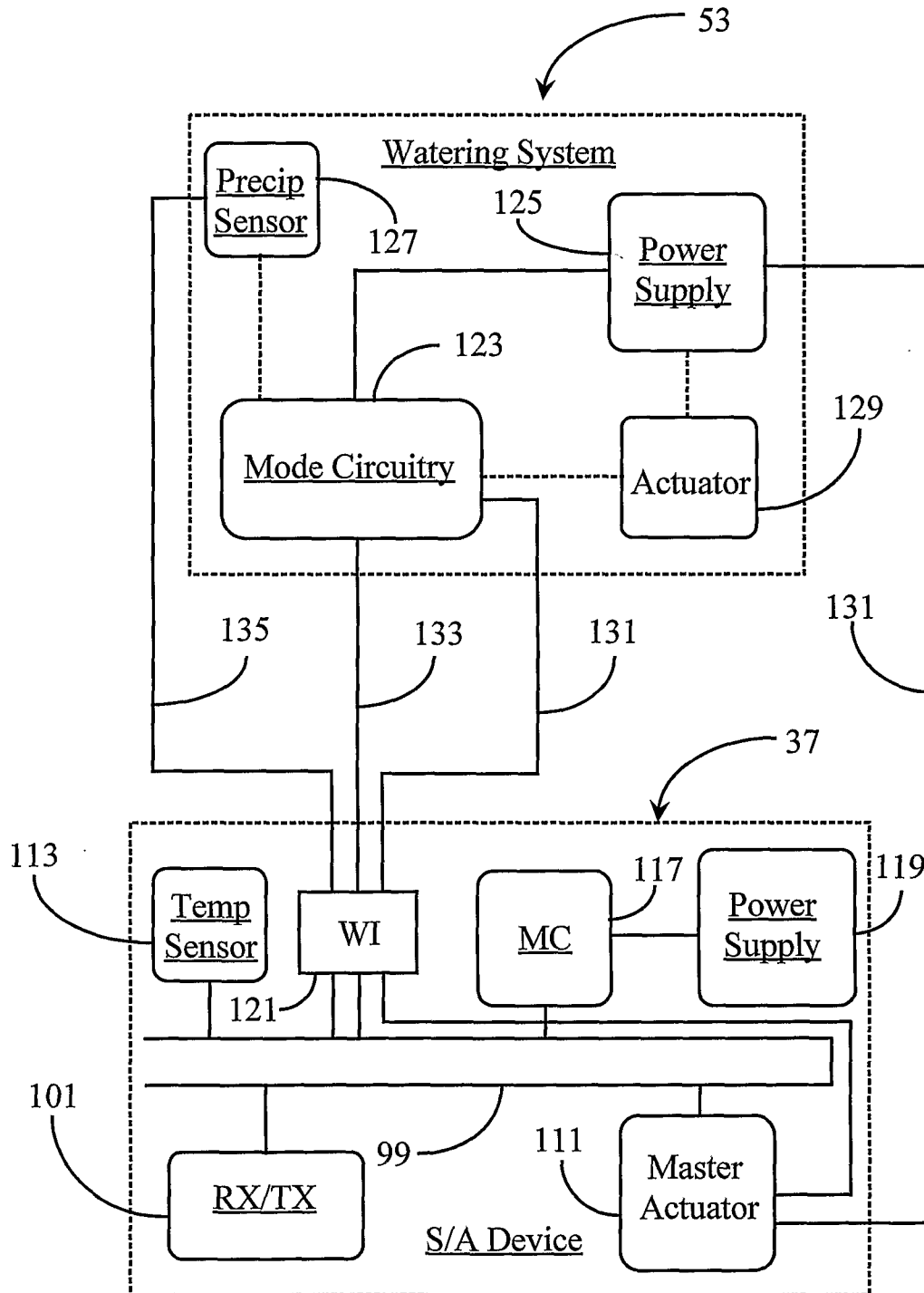


Fig. 5

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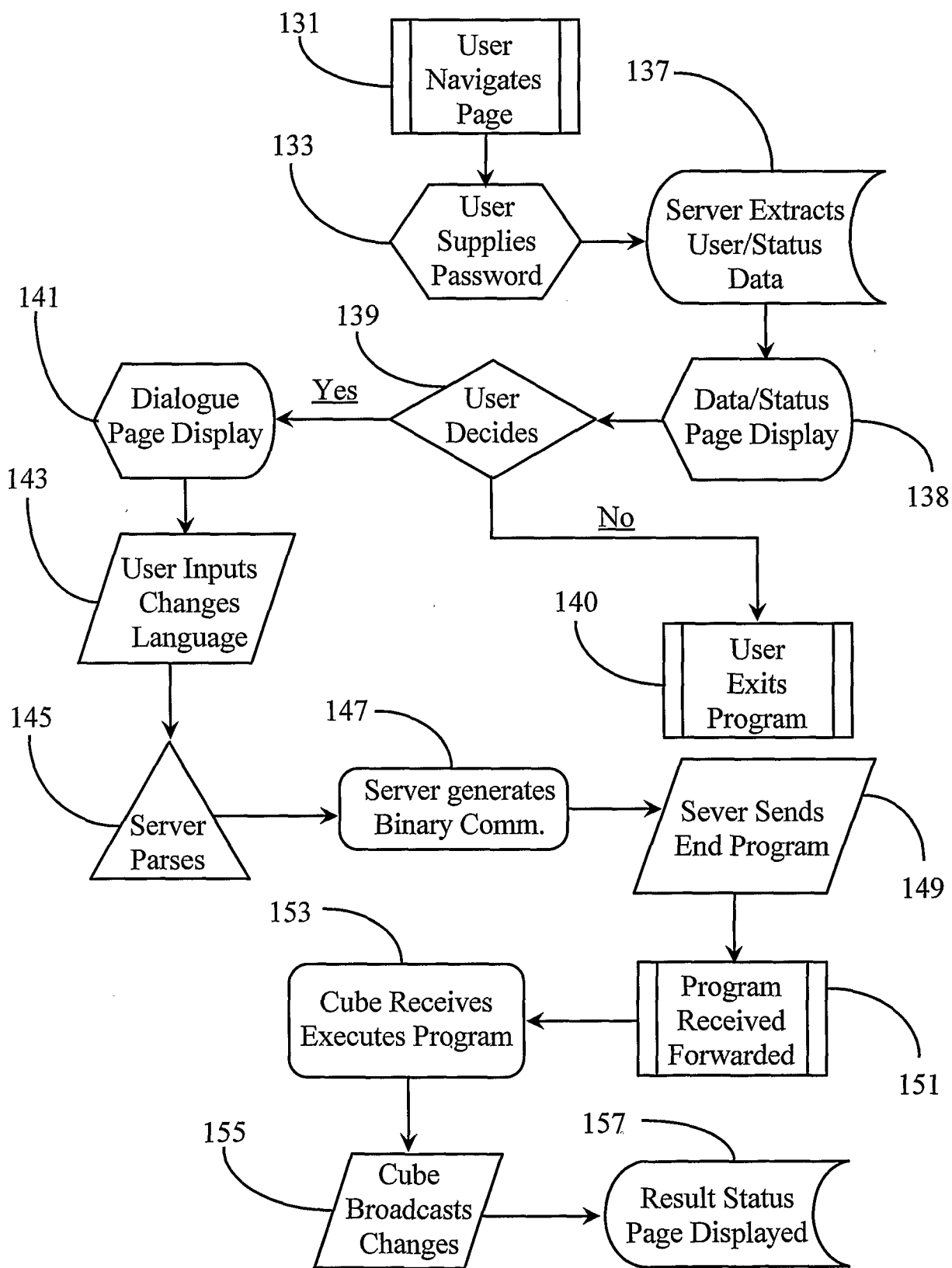
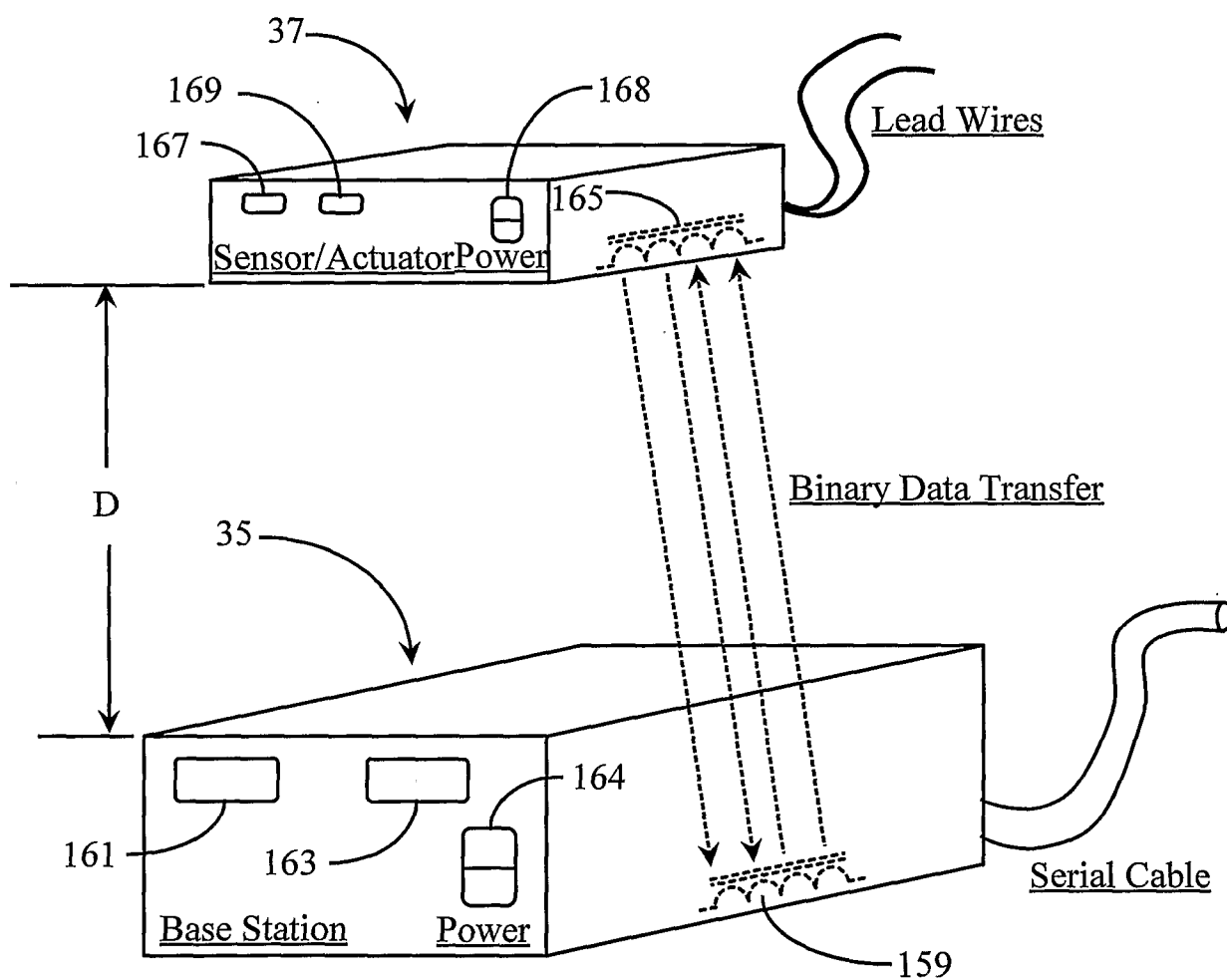


Fig. 6

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MI Magnetic Induction (configuring)

Fig. 7

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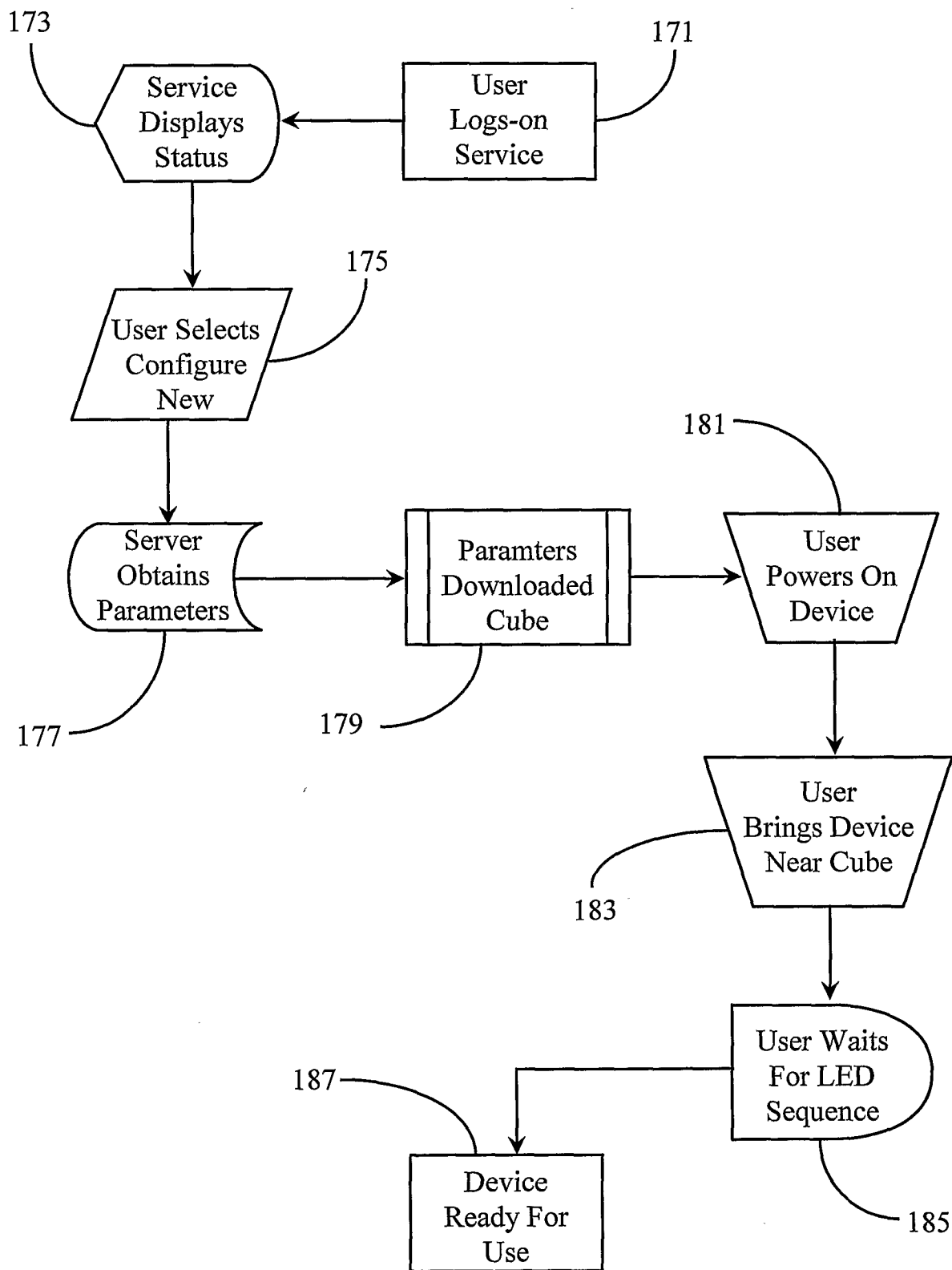


Fig. 8

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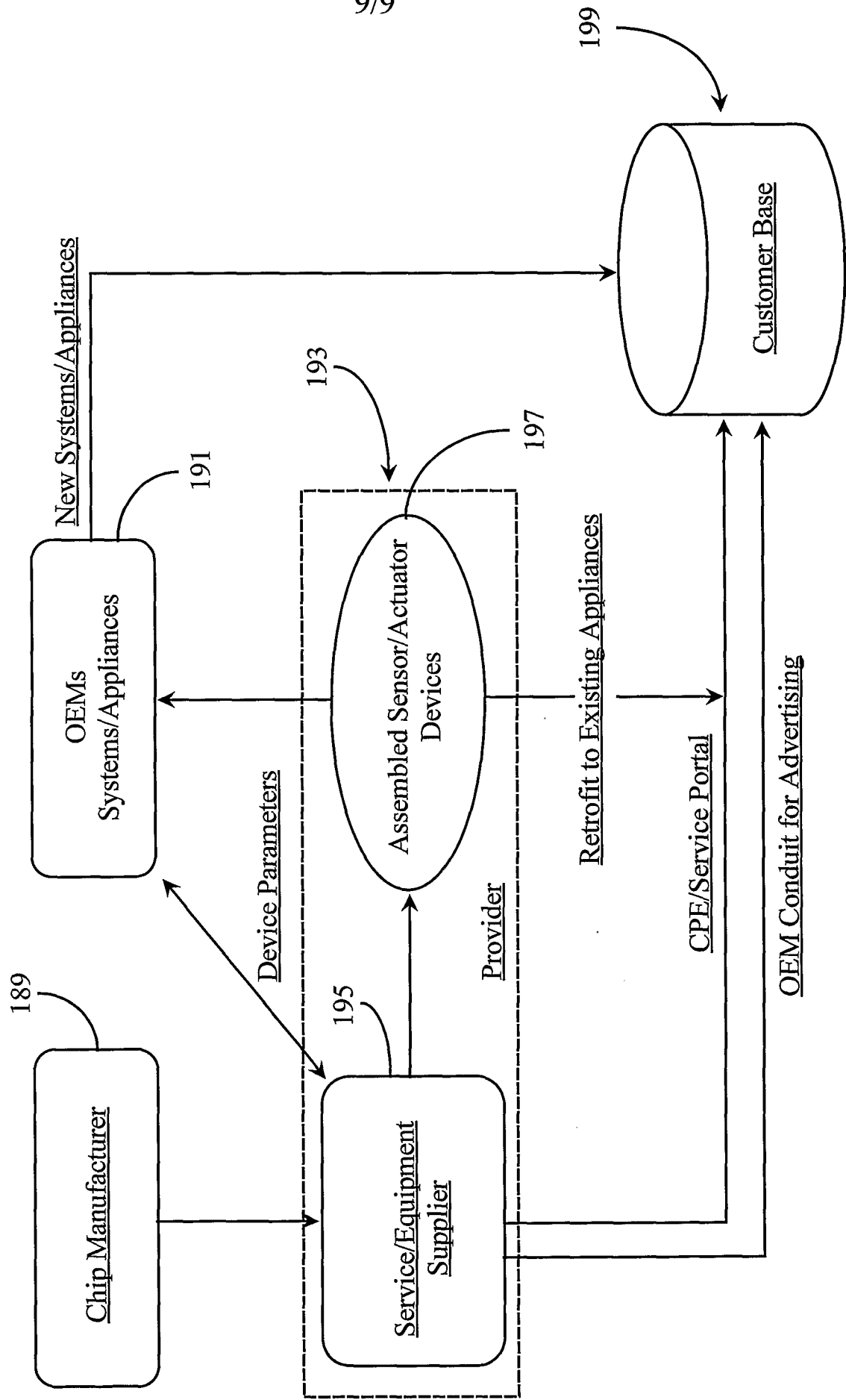


Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 15/16

US CL : 709/231

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 6112,246 A (HORBAL et al) 29 August 2000, col. 3, line 26-col. 21, line 45.	1-25
Y	US 5,512,890 A (EVERSON, JR. et al) 30 April 1996, col. 3, line 18-col. 8, line 53.	1-25

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	
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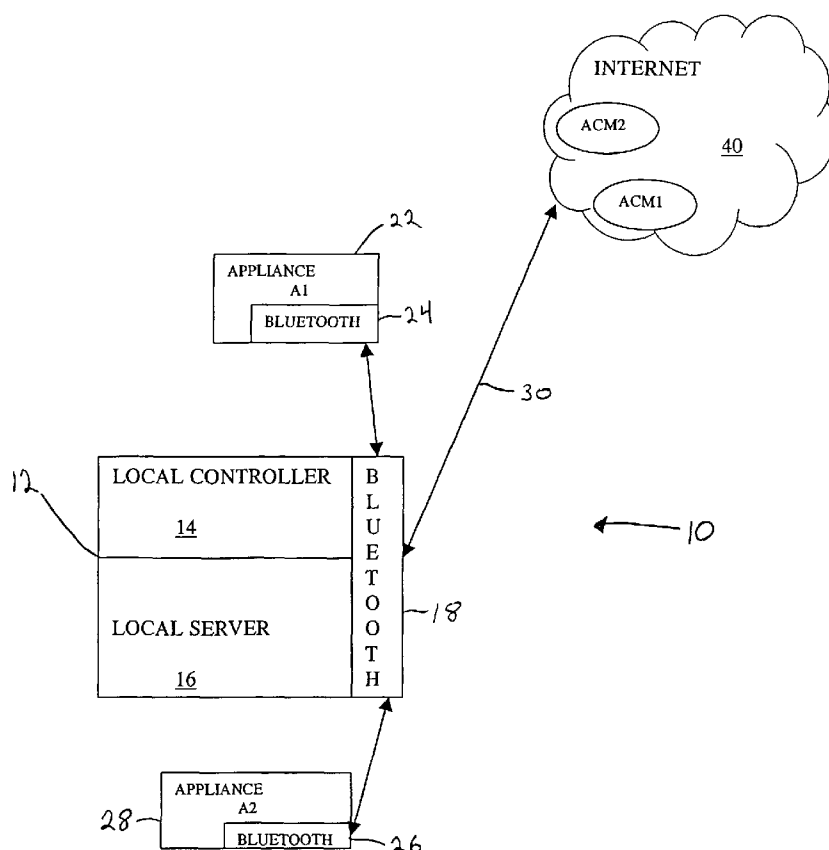
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[Continued on next page]

(54) Title: NETWORK AND METHOD FOR CONTROLLING APPLIANCES



(57) Abstract: An appliance network for controlling appliances from a remote location. The appliances include memory which contains an address location from which an appliance control module can be located for controlling a corresponding appliance. The address location is provided to a local controller, preferably by wireless transmission, which then uses the address location to access the appliance control module. Once accessed, the appliance control module is stored on a local server for use in controlling the corresponding appliance. In a preferred embodiment, a security feature is included to limit appliance control access to authorized users.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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Network and Method for Controlling Appliances

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a local network for providing remote control of appliances incorporated in the network.

2. Description of the Related Art

10 With the development of more sophisticated household appliances and the increased use of wireless communication technology such as, for example, Bluetooth, it is envisioned that household appliances will be networked to interact or communicate within a local
15 environment, e.g., a home or office. Personal wireless communication devices and handheld controllers such as mobile phones, personal digital assistants (PDAs) with a GSM card, etc., are convenient devices for controlling such appliances. However, most appliances still lack the
20 processor power of, for example, full Java support needed for such advanced appliance control. Moreover, to obtain such interaction or interoperability among appliances, especially appliances from different manufacturers, complex standards and protocols must be adopted by the
25 manufacturers so that a common "language" will be employed. This, however, is a further drawback because most appliance manufacturers prefer to develop and utilize separate and proprietary operating protocols for their appliances which are not interchangeable or useable
30 with appliances from other manufacturers.

 Accordingly, a local network is desired which provides for interoperability of appliances without the need for a common operating protocol.

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SUMMARY OF THE INVENTION

The present invention is directed to a process and network for providing interaction and control of appliances in a common environment. Each appliance, e.g. coffee maker, VCR, dishwasher, room heating thermostat, etc., has an appliance control module (ACM) software application which is made available by the appliance manufacturer. A local wireless communication interface, such as Bluetooth, is integrated with each appliance for communicating with a local controller and server, such as a wireless communications device (e.g., mobile phone, PDA with GSM capability, etc.), which may, optionally, operate in conjunction with a local computer. The ACM is installed onto the local server and control of the corresponding appliance can then be performed by accessing the local server with the local controller, e.g., by use of a mobile phone.

In a preferred embodiment, each ACM is accessible from a remote location such as an Internet web site associated with the appliance manufacturer. Each appliance is equipped with a memory for storing a manufacturer internet address and, optionally, an appliance identification code such as a model or serial number. When an appropriate command is received by an appliance such as by an associated Bluetooth receiver, the appliance transmits a remote location address, e.g., an Internet web address such as a URL, of the appliance manufacturer to the local controller. Along with the URL, the appliance identifier such as a model and/or serial number may be communicated. This information is then used to access a remote server to obtain the appropriate appliance control module which will be

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installed on the local server for use in controlling the appliance.

In accordance with the present invention, the local server may be integrated into a mobile device or
5 the mobile device may function as a user interface (UI) for accessing the local server.

In accordance with another embodiment of the present invention, the ACM may be a device independent module, e.g. Java Remote Method Invocation.
10 Alternatively, as the remote appliance manufacturer server will recognize the type of operating system used by the local server due to the contact made by the local server, the ACM may be platform dependent binary code. Thus, based on the operating system platform used by the
15 local server, an appropriate and compatible version of the ACM will be provided by the remote server.

Once the appropriate ACM is installed in the local server, the appliance can be controlled by accessing the ACM in an appropriate manner, such as by
20 entering appropriate commands in a wireless device (e.g. mobile phone) which is in communication with the local server. Such communication may occur via a local communication link which may be a wireless or hard-wired link, or via an Internet connection such as when a mobile
25 phone is used to access the local server via the Internet.

In a preferred embodiment, security functionality is provided or incorporated in the local server for user authentication prior to accessing the
30 appliance.

Other objects and features of the present invention will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however,

that the drawings are designed solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims. It should be further understood that the drawings are not necessarily drawn to scale and that, unless otherwise indicated, they are merely intended to conceptually illustrate the structures and procedures described herein.

10 BRIEF DESCRIPTION OF THE DRAWINGS

 In the drawings, wherein like reference numerals denote similar elements throughout the views:

 FIG. 1 is a schematic illustration of an appliance control network in accordance with a preferred embodiment of the present invention;

 FIG. 2 is a schematic illustration of an appliance control network in accordance with an alternative embodiment of the present invention; and

 FIG. 3 is a block diagram of the steps performed in the method of the present invention.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

 FIG. 1 illustrates a presently preferred network 10 in accordance with the present invention. Network 10 includes a control block 12 containing a local controller 14, a local server 16, and a wireless local transceiver 18 for wirelessly communicating signals among a first appliance (A1) 22 and a second appliance (A2) 28 within the network 10. The appliances 22, 28 can be any variety of commonly-known appliances such as, for example, a dishwasher, coffee maker, VCR, oven, room heater thermostat, etc., and each is in communication with control block 12 such as by hard-wiring connection or, more preferably, by a wireless transceiver 24, 26 for

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communicating with transceiver 18. It is presently contemplated that Bluetooth transceivers which provide for communication between two or more devices within a range of 10 meters, for a normal power mode, and up to
5 300 meters, for a high power mode, will be employed in the appliances and control block in a manner known to those having ordinary skill in the art. As explained more fully below, each appliance A1, A2 has a corresponding appliance control module (ACM) offered by
10 or on behalf of the appliance manufacturer and used by the local server 16 to operate the appliance.

The ACM is a software driver package that provides an interface to the services offered by the appliance. The ACM may accompany the appliance (e.g. as
15 a diskette, CD or other software storage means included in the appliance packaging or offered by the appliance manufacturer), or may be available over the Internet. When an appliance is purchased, the ACM can be installed onto the local server in a manner well-known to those
20 having ordinary skill, such as by inserting the ACM diskette into a computer disk drive. In a preferred embodiment, each appliance will have a memory which contains a UL indicating an Internet address of the ACM. The appliance memory may also contain additional
25 information such as an appliance model or serial number, etc.

The local controller 14 and local server 16 may be integrally formed in the control block 12, as shown in FIG. 1, and may be implemented by a wireless
30 communications device having appropriate processing capabilities for operating or executing the appropriate ACM for a corresponding appliance. Mobile phones or PDAs and lap top computers having GSM capability may be suitable for this purpose. Alternatively, and as

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illustrated in the network 10 of FIG. 2, the local controller 14 may be separate and discrete from the local server 16. In this embodiment, the appliances A1, A2 are interfaced with the local server 16 in the same manner as
5 in the network of FIG. 1 (e.g. using Bluetooth transceivers), with the local controller 14 used to provide appropriate commands to the local server. Thus, in the embodiment of FIG. 2, local controller 14 may be a standard mobile phone or other communications device with
10 the local server function provided by a personal computer or other processing device located within an operating environment of the appliances (e.g. a home, office, etc.). In either case (i.e. the embodiment of FIG. 1 or FIG. 2), it should be understood that although only two
15 appliances are shown, this is done for illustration only, and numerous appliances can be incorporated in the inventive network without departing from the scope of the invention.

With continued reference to FIG. 1, the control
20 block 12 is connectable to a global computer network, such as the Internet 40, in any well known manner, such as through wireless or wired connection 30. As stated above, each appliance A1, A2 has a corresponding ACM which may be provided with each appliance (e.g. a
25 diskette, etc.) or which may be contained on or accessible via the Internet 40. If accessible over the Internet, the location of the corresponding ACM will be provided via an associated web site address or URL. For example, the desired ACM may be located at a general web
30 site of the appliance manufacturer which may also contain general information about the manufacturer and its products, etc. Alternatively, the ACM may be located at a specific web site established by or with the authority of the appliance manufacturer for containing the

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appliance control modules of numerous appliances. In either case, the location of the desired ACM (e.g. the URL) is used by the control block 12 to access the ACM. The ACM will then be installed on the local server 16, in
5 a manner known in the art, for controlling the corresponding appliance. Once installed, the appliance corresponding to the ACM can be controlled through the input of appropriate commands on the local controller 14 and through local wireless communication to the
10 corresponding appliances.

Communication with the appliance for incorporating the appliance in the network 10 is initiated by the control block 12 such as through the local controller 16 by, in the case of a mobile telephone
15 local controller, pressing an appropriate command or key or button on the mobile phone. This will cause the local controller to poll the appliances located within the local environment, e.g. within the Bluetooth transmission environment of 10 - 300 meters from the mobile phone.
20 This is shown as step 3.1 in FIG. 3. The polling command will cause the polled appliances to transmit to the local controller the necessary ACM location information, such as the appliance manufacturer's URL, the appliance serial number, etc. (step 3.2). This information is then used
25 by the local controller to determine whether a corresponding ACM is already installed in the local server 16. If an ACM is needed, the local controller uses the URL and other received information from the appliance to access the Internet 40 to locate the ACM
30 (step 3.3). Alternatively, the local controller may prompt a user to install a provided disc containing the ACM. Once the ACM is obtained, it is copied to either the local controller 14 or the local server 16 (step 3.4)

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and is installed on the local server (step 3.5) for operating the corresponding appliance.

Although for an Internet ACM location, the network 10 of FIG. 1 contemplates ACM transmission from the Internet to the control block 12, it will be appreciated that such transmission can occur directly or indirectly with the local controller 14 as shown in FIG. 2. In this embodiment, the local controller 14, such as a mobile phone, will access the Internet in a known manner and request the transmission of the desired ACM. The ACM can be transmitted directly to the mobile phone, which will then transmit it for storage and installation to the local server 16, or the ACM can be transmitted directly to the local server 16. In either case, the desired ACM is accessed from an Internet-stored location and installed onto the local server 16 for use in controlling a corresponding appliance (e.g. A1 or A2).

To ensure interoperability between different platforms, the appliance control module software can introduce the appliance as a remote method invocation (RMI) service with an appropriate Java interface. The appliance control modules can also be separately built for different operating systems and languages, in which case the appliance control module may be downloaded from the remote server URL as platform-dependent binary code. The operating system of the server appliance will then be automatically checked and a correct driver selected. The appliance control modules can also include proprietary user interface solutions for different appliances. These can also be either platform-independent Java code or platform dependent binary code. When the driver has been loaded to the local server and access of the user to control the appliance has been checked (as explained

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below), the user can utilize the driver software to control the appliance.

The appliance control module user interface solution can be HTML based, or a combination of HTML and an operating-system dependent plug-in. The browser can be a WML browser or a HTML browser. Additionally, the browser can also support Java applets. Authentication of the remote server using, for example, screen script language (SSL) or other methods may be needed when new ACMs are downloaded from a remote server or whenever the appliance is accessed.

If the local server software is operating from a stationary PC, such as a PC located in a home containing the appliances, the local controller or phone can establish a connection with the PC as depicted in FIG. 2, and the PC will control the appliances. As explained above, the home control application can be a web server enabling local and global access to the home control application over the Internet. The PC can also utilize a wireless application protocol (WAP) gateway to enable the use of the home control application with WAP phones. In this manner, the local controller can access the local server via the Internet to instruct the control of certain appliances from a remote location. Locally, Bluetooth can be used to directly access the local PC based server from the local controller or phone. For example, if a mobile phone is used as a local controller 14, and in the case of controlling a room heat thermostat in a user's home containing the local server 16, the phone will access the local server to command operation of the thermostat (e.g., to turn on/off, set temperature, etc.). This may be accomplished by accessing the local server via a Bluetooth connection when the user is in the home, or via an Internet connection outside of the user's

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home which provides access to the local server by using the phone. Once accessed, the desired appliance and command will be selected by the user pressing appropriate buttons on the phone such as by selecting commands from a menu on the phone. Such functionality can also be employed to access other appliances, such as a VCR, by a user in a remote location instructing the local server to operate the VCR for recording a desired program, etc.

It is contemplated that, from time to time, manufacturers may update certain appliance control modules for various reasons such as to implement improved control features or correct operational defects, etc. Thus, the local controller or local server may contact the manufacturers' URL addresses to determine whether such updated ACMs exist, whereupon the updated ACMs will be installed on the local server to replace or modify or upgrade existing ACMs for that appliance.

For security purposes, it is desirable that only authorized users of appliances be given access to control such appliances. Thus, and in accordance with the present invention, an authentication feature is provided to determine whether a particular user is authorized to access a particular appliance. The authentication feature links the appliance and the local server to each other with a designated user identification. This is easily implemented where, for example, the local server is a mobile phone, by using the SIM and PIN of the phone. If the local server is a PC or other processor device, a password can be selected. When the local controller is first used to access a particular appliance, the local controller (e.g. phone) will be designated in the local server as a master controller for that device. The master controller device can then

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designate additional users to have access for controlling the particular appliance.

Thus, while there have shown and described and pointed out fundamental novel features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Moreover, it should be recognized that structures and/or elements and/or method steps shown and/or described in connection with any disclosed form or embodiment of the invention may be incorporated in any other disclosed or described or suggested form or embodiment as a general matter of design choice. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

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CLAIMS

What is claimed is:

1. A method for networking and controlling appliances within a local environment containing a local controller and a local server, each appliance being controllable by a corresponding appliance control module, comprising the steps of:

obtaining an appliance control module for each appliance;

installing on the local server, the obtained appliance control modules;

providing communication between the local server and the appliances; and

accessing the local server with the local controller to select one of the installed appliance control modules for controlling the corresponding appliance.

2. The method of claim 1, wherein each appliance has a memory-stored address for providing a location of the corresponding appliance control module, said method further comprising the steps of transmitting the memory-stored address from the appliance to the local controller, and accessing a remote location using the transmitted address to locate the corresponding appliance control module.

3. The method of claim 2, wherein the local controller, local server and each appliance contains a wireless transceiver, and wherein said step of transmitting comprises the step of wirelessly transmitting.

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4. The method of claim 2, wherein the memory-stored address is a URL Internet address.

5 5. The method of claim 4, wherein said accessing step comprises the step of connecting to the Internet using the URL to locate the appliance control module.

10 6. The method of claim 1, wherein the local controller and the local server comprise an integrally formed wireless communications device.

15 7. The method of claim 6, wherein said wireless communications device comprises one of a mobile phone and a personal digital assistant.

20 8. The method of claim 2, wherein the local controller comprises one of a mobile telephone and a personal digital assistant.

9. The method of claim 8, wherein said local server comprises a personal computer.

25 10. The method of claim 1, wherein the appliances, local server and local controller are capable of wirelessly communicating with each other using Bluetooth transceivers.

30 11. The method of claim 2, wherein the appliances, local server and local controller are capable of wirelessly communicating with each other using Bluetooth transceivers.

12. The method of claim 1, wherein the step of accessing further comprises providing a select user with access to the appliances based on a user identifier.

5 13. The method of claim 12, wherein the local controller is a mobile phone and wherein said step of providing a user with access further comprises using a SIM and PIN associated with the phone as the user identifier.

10

14. The method of claim 12, wherein the local server is a personal computer and wherein said step of providing a user with access further comprises using a personal computer password as the user identifier.

15

15. The method of claim 2, wherein said step of transferring comprises the step of accessing the remote location comprises transferring the located appliance control module to the local controller and then
20 transferring the appliance control module from the local controller to the local server.

16. The method of claim 1, further comprising the step accessing the local server with the local
25 controller to control a select appliance with a corresponding appliance control module.

17. The method of claim 1, wherein the local controller comprises a mobile phone and wherein said
30 accessing step comprises the step of selecting a command on the mobile phone to control a select appliance.

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18. The method of claim 13, further comprising the steps of using the local controller to grant a second device authority for accessing the local server.

5 19. A network for controlling appliances within a local environment containing a local controller and a local server, each appliance being controllable by a corresponding appliance control module, comprising:

means for obtaining an appliance control module
10 for each appliance;

means for installing on the local server, the obtained appliance control modules;

means for providing communication between the local server and the appliances; and

15 means for accessing the local server with the local controller to select one of the installed appliance control modules for controlling the corresponding appliance.

20 20. The network of claim 19, wherein each appliance has a memory-stored address for providing a location of the corresponding appliance control module, said network further comprising means for transmitting the memory-stored address from the appliance to the local
25 controller, and means for accessing a remote location using the transmitted address to locate the corresponding appliance control module.

21. The network of claim 20, wherein the local
30 controller, local server and each appliance contains a wireless transceiver, and wherein said means for transmitting comprises means for wirelessly transmitting.

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22. The network of claim 20, wherein the memory-stored address is a URL Internet address.

23. The network of claim 22, wherein said
5 means for accessing comprises the step of connecting to the Internet using the URL to locate the appliance control module.

24. The network of claim 20, wherein the local
10 controller and the local server comprise an integrally formed wireless communications device.

25. The network of claim 24, wherein said
15 wireless communications device comprises one of a mobile phone and a personal digital assistant.

26. The network of claim 20, wherein the local
controller comprises one of a mobile telephone and a
personal digital assistant.

20

27. The network of claim 26, wherein said
local server comprises a personal computer.

28. The network of claim 19, wherein the
25 appliances, local server and local controller are capable of wirelessly communicating with each other using Bluetooth transceivers.

29. The network of claim 20, further
30 comprising means for providing a select user with access to the appliances based on a user identifier.

30. The network of claim 29, wherein the local
controller is a mobile phone and wherein said means for

providing a user with access further comprises using a SIM and PIN associated with the phone as the user identifier.

5 31. The network of claim 19, wherein the local server is a personal computer and wherein said means for providing a user with access further comprises using a personal computer password as the user identifier.

10 32. The network of claim 19, wherein said means for transferring comprises means for transferring the located appliance control module to the local controller and means for transferring the appliance control module from the local controller to the local
15 server.

 33. The network of claim 32, wherein the local controller comprises a mobile phone and wherein said means for accessing comprises entering a menu selection
20 on the mobile phone.

 34. The network of claim 30, further comprising means for the local controller to grant a second device authority for accessing the local server.

25 35. A network for controlling an appliance contained within a local environment, the appliance being controllable by a corresponding appliance control module and having a memory-stored address for providing a
30 location of the corresponding appliance control module, comprising:

 a local controller having a wireless transceiver for communicating with the appliance and for receiving the memory-stored address from the appliance,

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the memory-stored address being used to locate the appliance control module;

a local server in communication with said local controller for receiving and storing the located
5 appliance control module.

36. The network of claim 35, wherein the memory-stored address corresponds to a location on a global computer network and wherein at least one of said
10 local controller and local server is capable of communicating with said global computer network.

37. The network of claim 35, wherein said local controller is a mobile phone.
15

38. The network of claim 36, wherein said local controller is a mobile phone.

39. The network of claim 38, wherein said
20 mobile phone is used to access the global computer network to locate the appliance control module and to transmit the appliance control module to said local server.

25 40. The network of claim 38, wherein said mobile phone, said local server and the appliance comprise Bluetooth transceivers for permitting wireless communication therebetween.

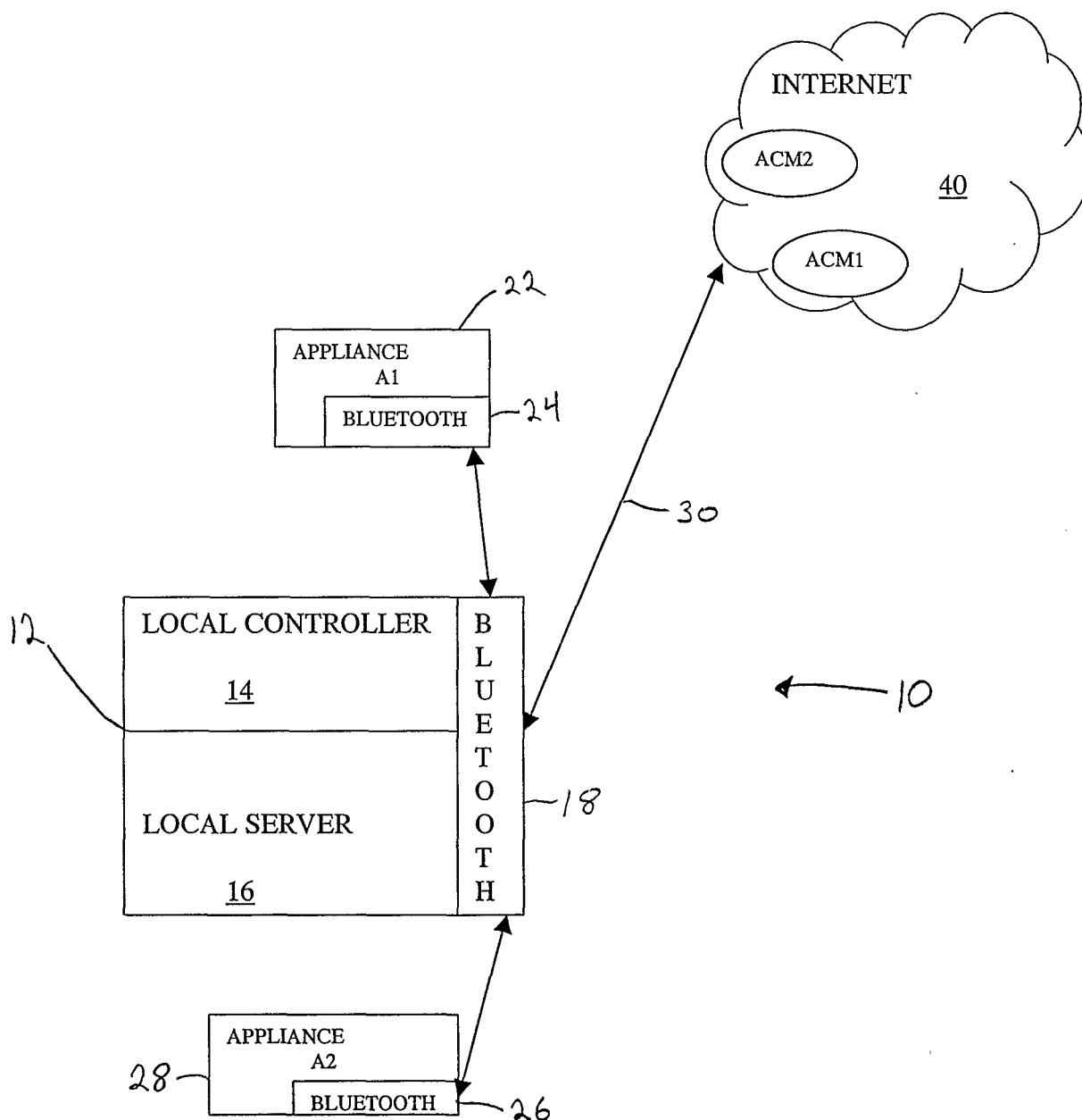


FIG. 1

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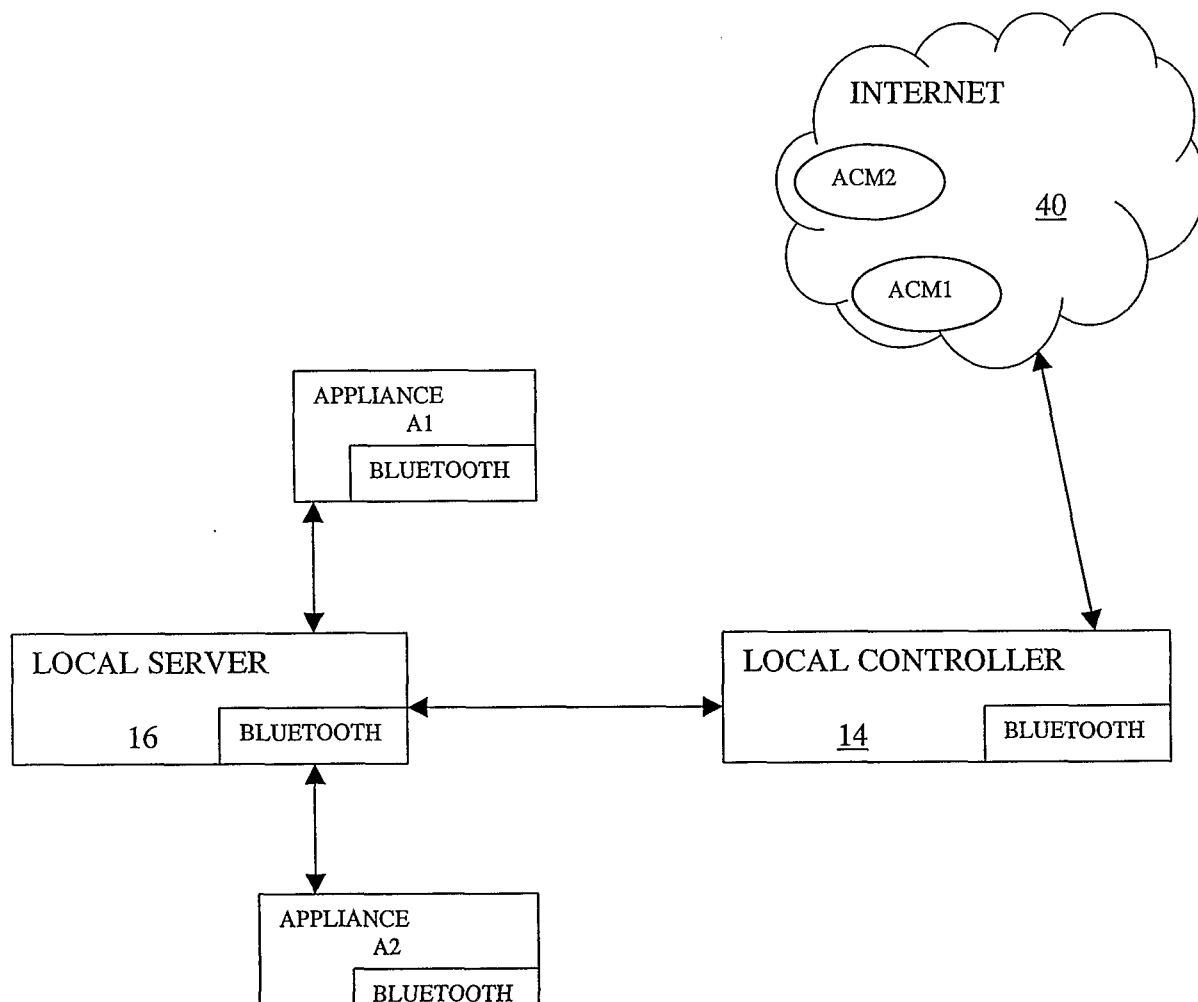


FIG. 2

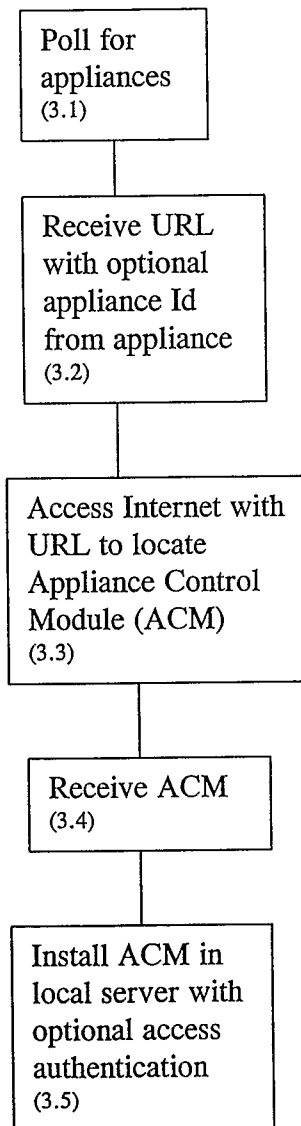


FIG. 3

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(12) **United States Patent**
Johnson et al.

(10) **Patent No.: US 6,580,950 B1**
(45) **Date of Patent: Jun. 17, 2003**

(54) **INTERNET BASED HOME COMMUNICATIONS SYSTEM**

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Dan Schulz, Fargo, ND (US); **Thor Iverson**, Fargo, ND (US); **Dan Malmstrom**, Fergus Falls, MN (US)

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/561,091**

(22) Filed: **Apr. 28, 2000**

(51) **Int. Cl.⁷** **G05B 11/01**
(52) **U.S. Cl.** **700/17; 700/83; 345/733**
(58) **Field of Search** 700/9, 17, 65,
700/83, 1, 19, 90; 709/218–220; 345/329,
733

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Primary Examiner—John Follansbee

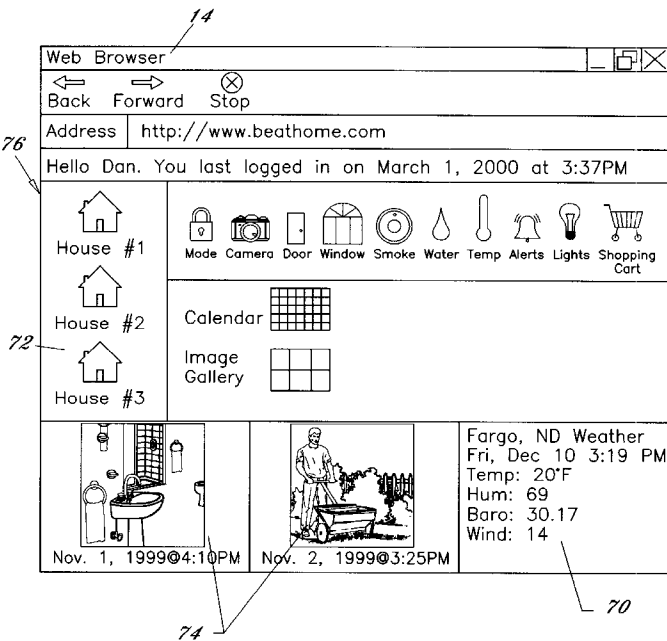
Assistant Examiner—Ronald D Hartman, Jr.

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(57) **ABSTRACT**

An Internet based home communications system for allowing a homeowner to monitor and control various features of their home from a distant location via a global computer network. The inventive system comprises a plurality of control devices positioned within a home, a control unit in communication with the plurality of control devices wherein the control unit is connected to a global computer network (i.e. Internet), and a data center having server computers connected to the global computer network and in communication with the control unit. The homeowner can view, monitor and control features of their home through the web page such as viewing interior images of their home or adjusting the thermostat for the interior of their home. In addition, the control unit may notify the appropriate supplier when propane or food becomes low within the home through the global computer network.

41 Claims, 11 Drawing Sheets



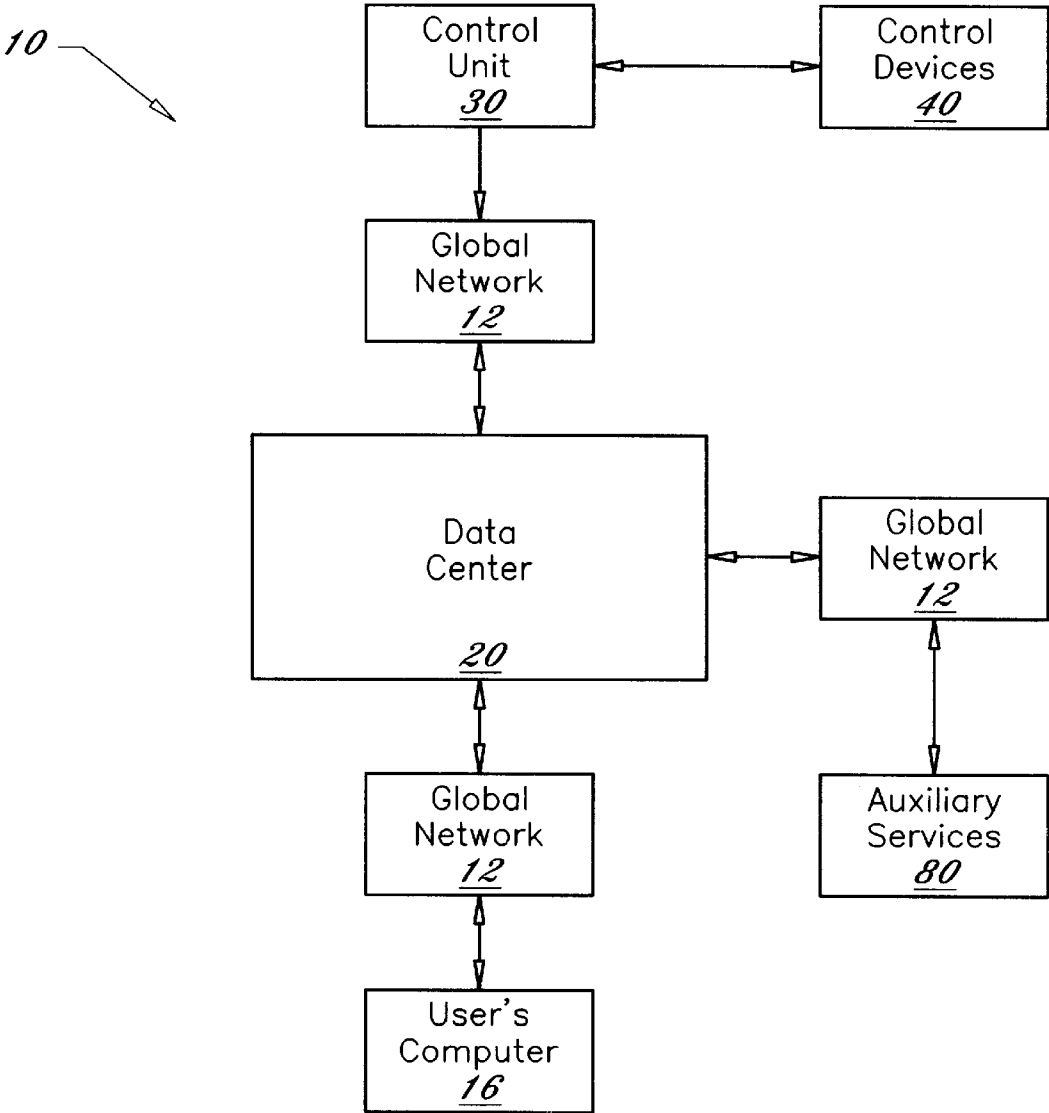


FIG. 1

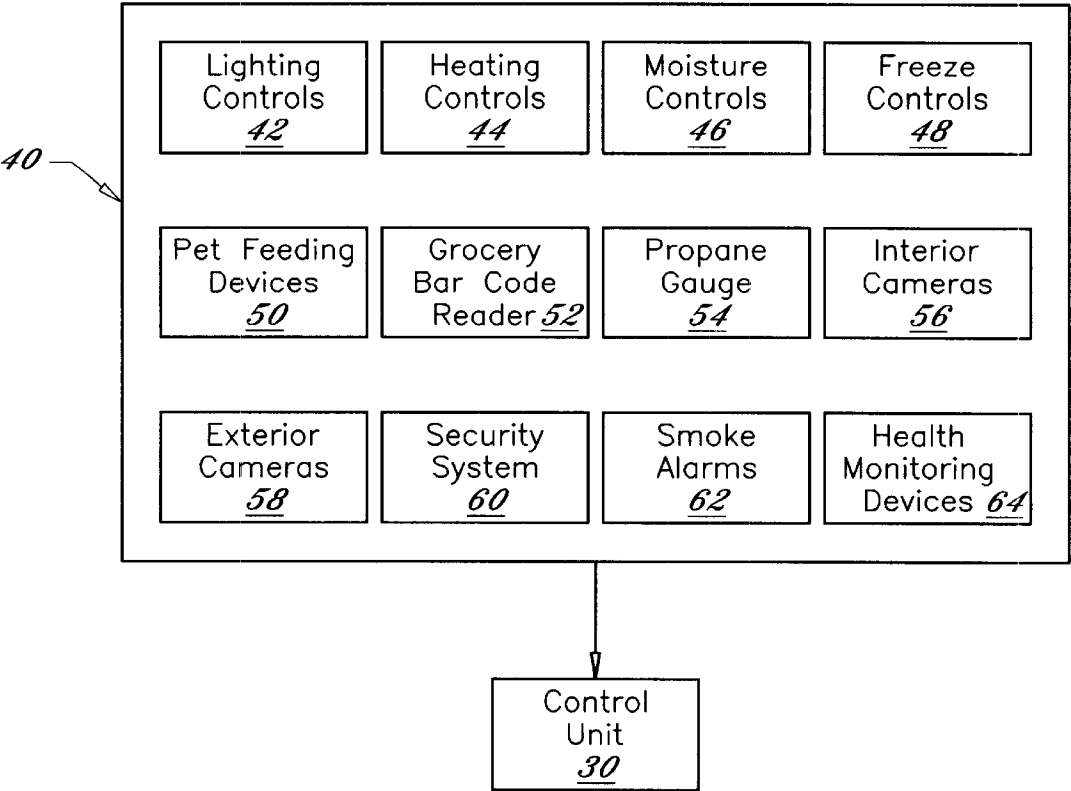


FIG. 2

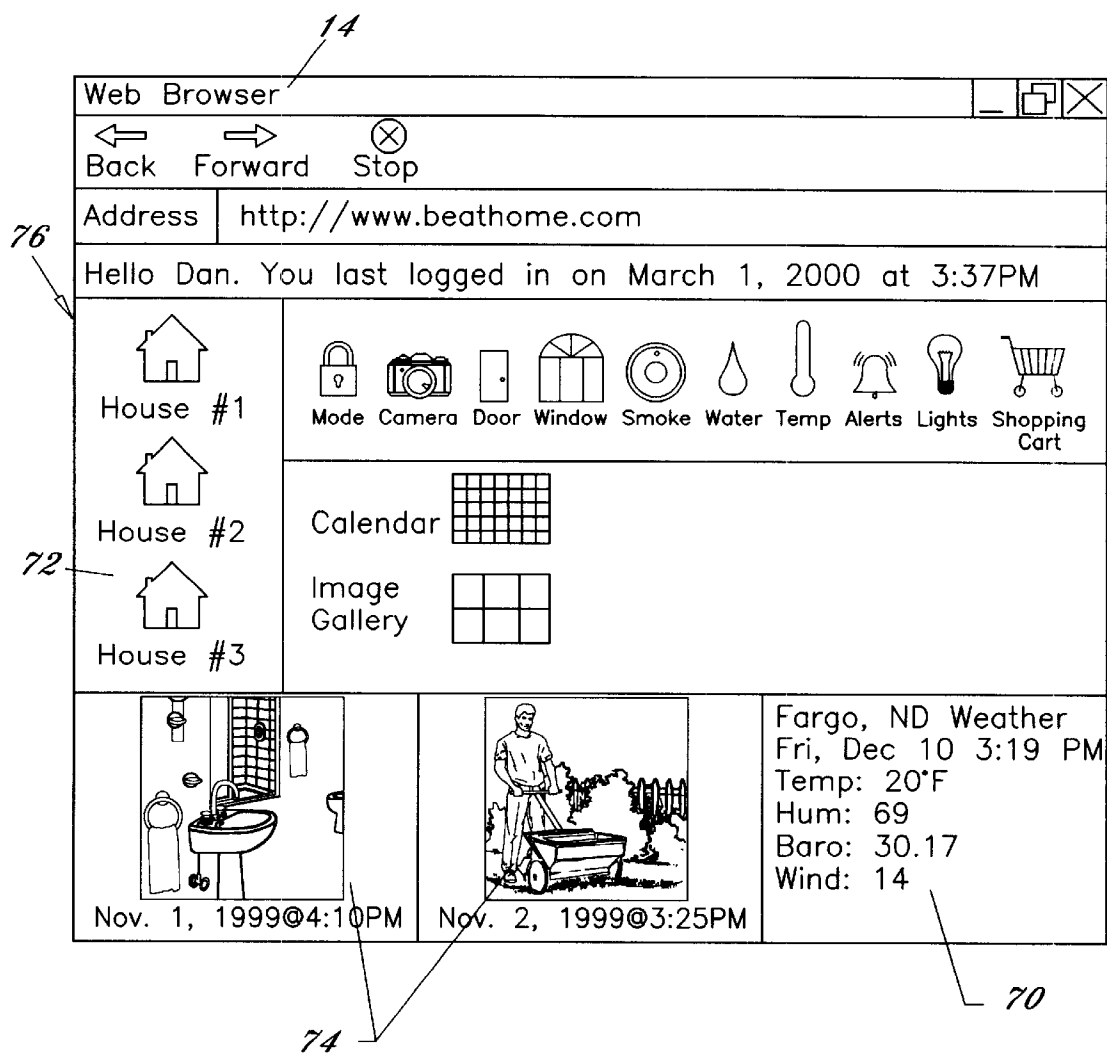


FIG. 3

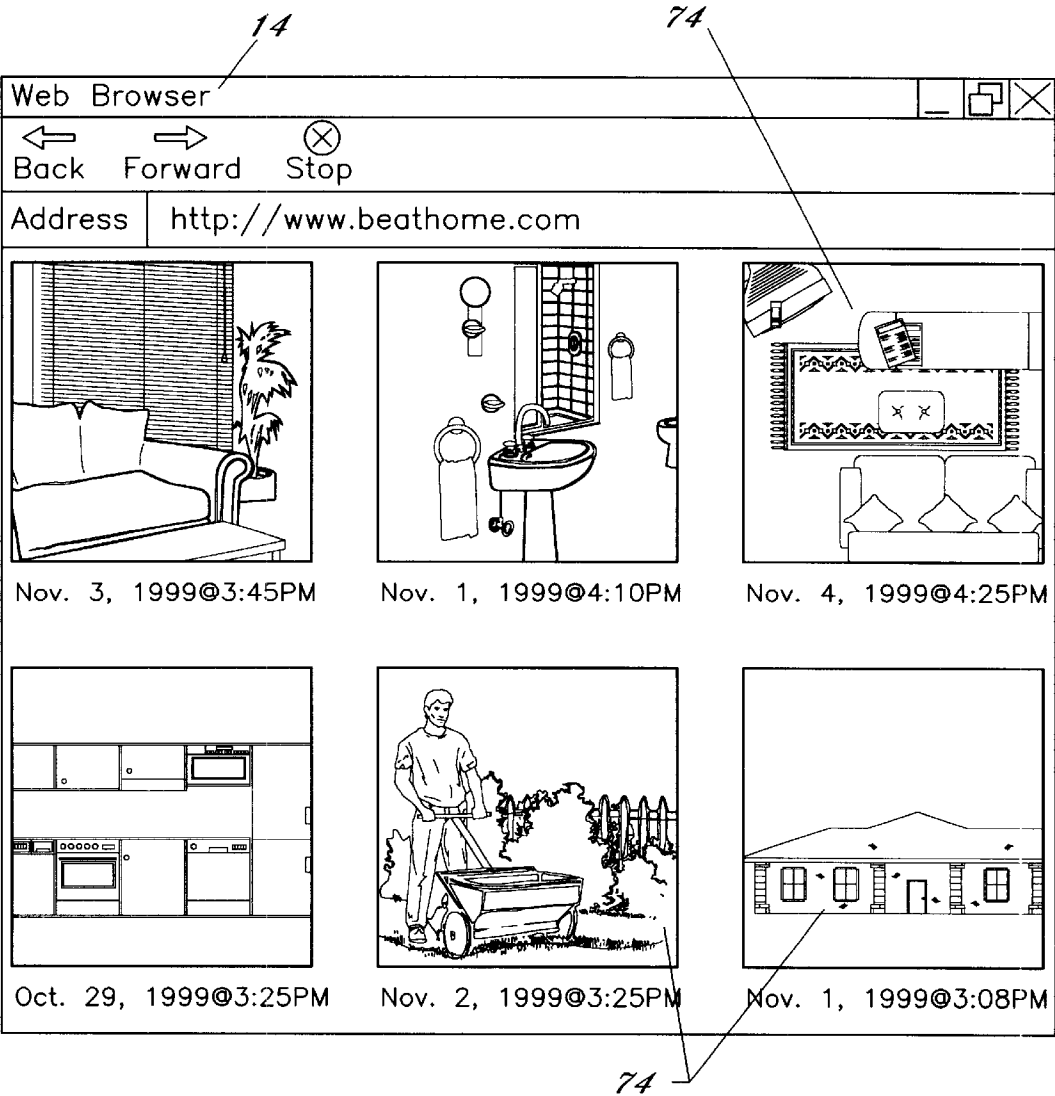
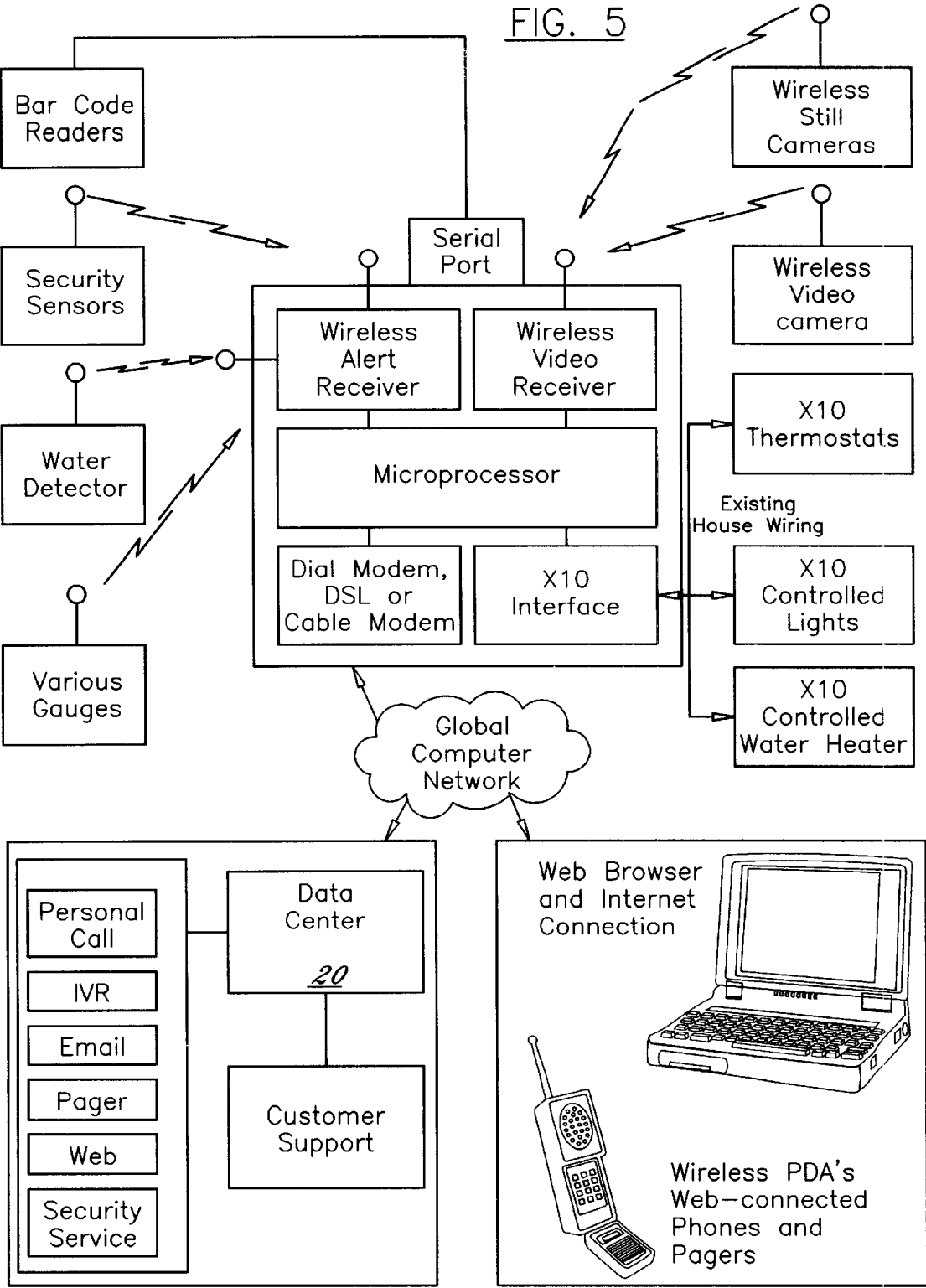


FIG. 4



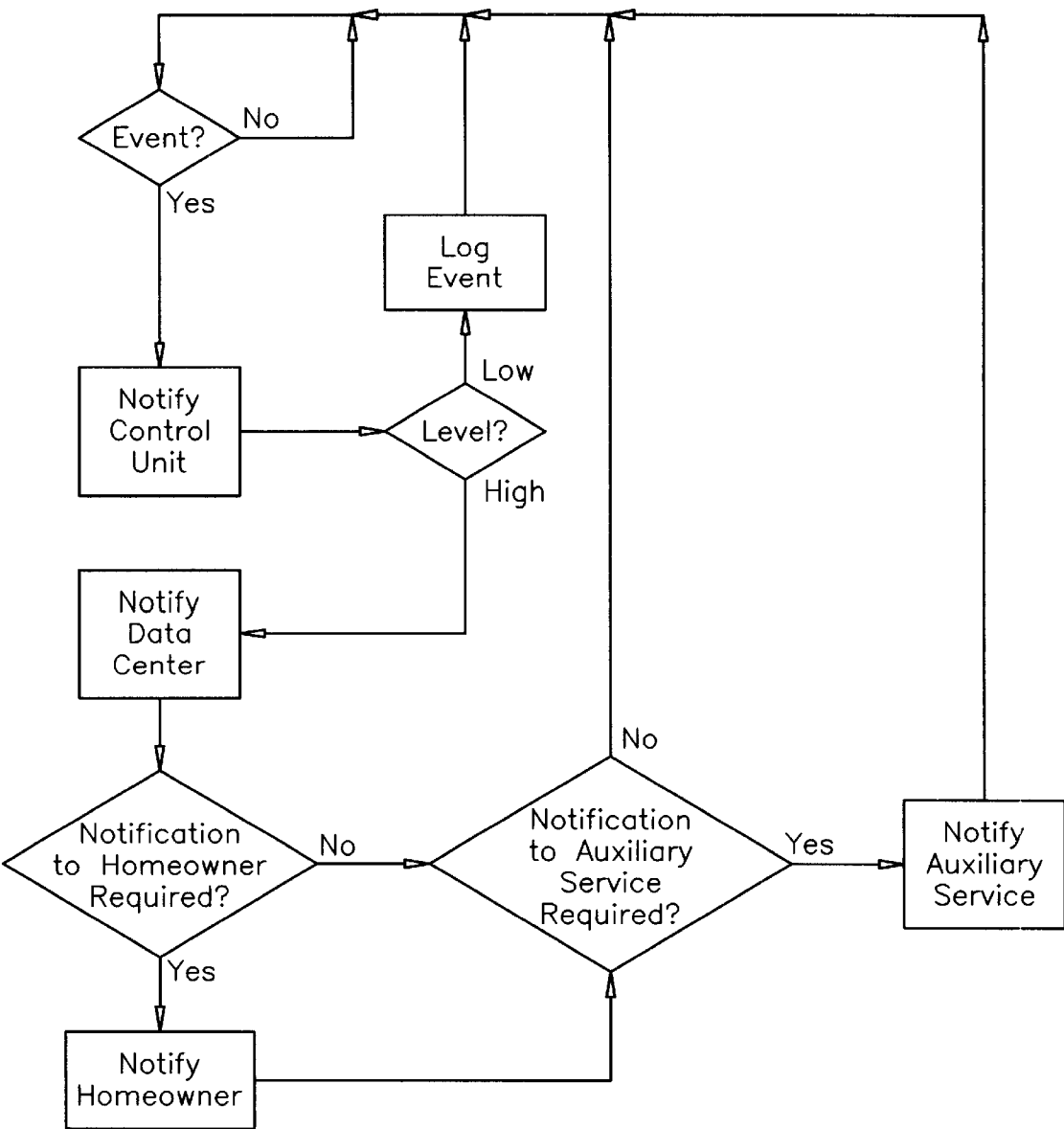
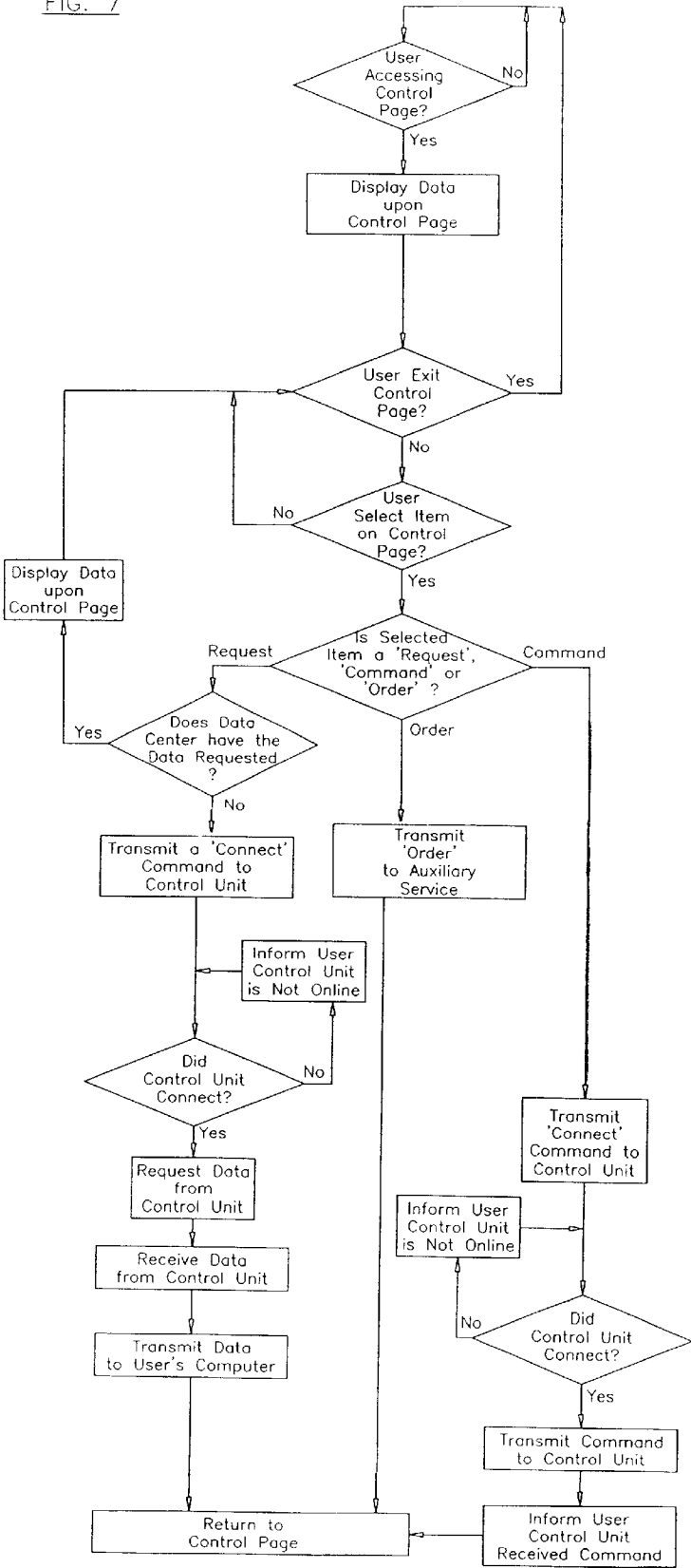


FIG. 6

FIG. 7



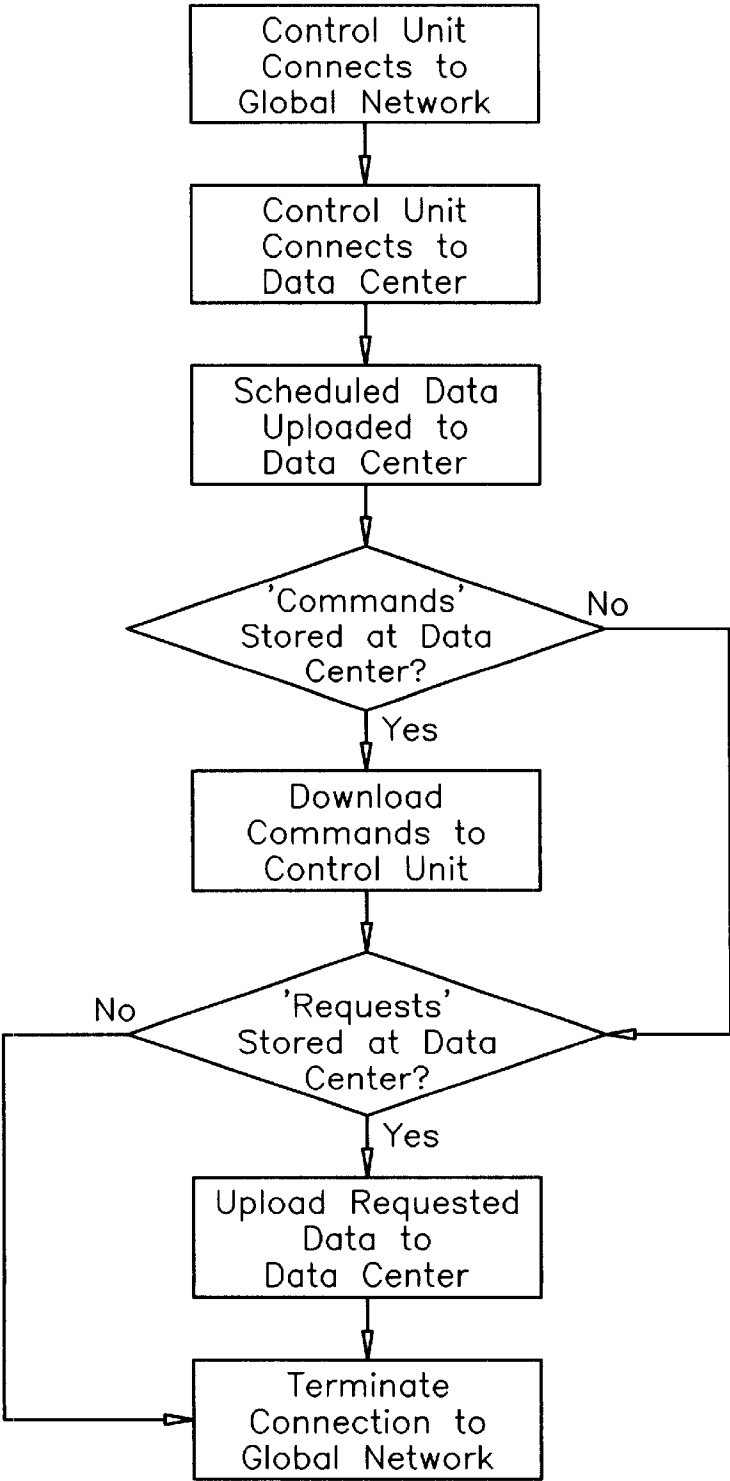


FIG. 8

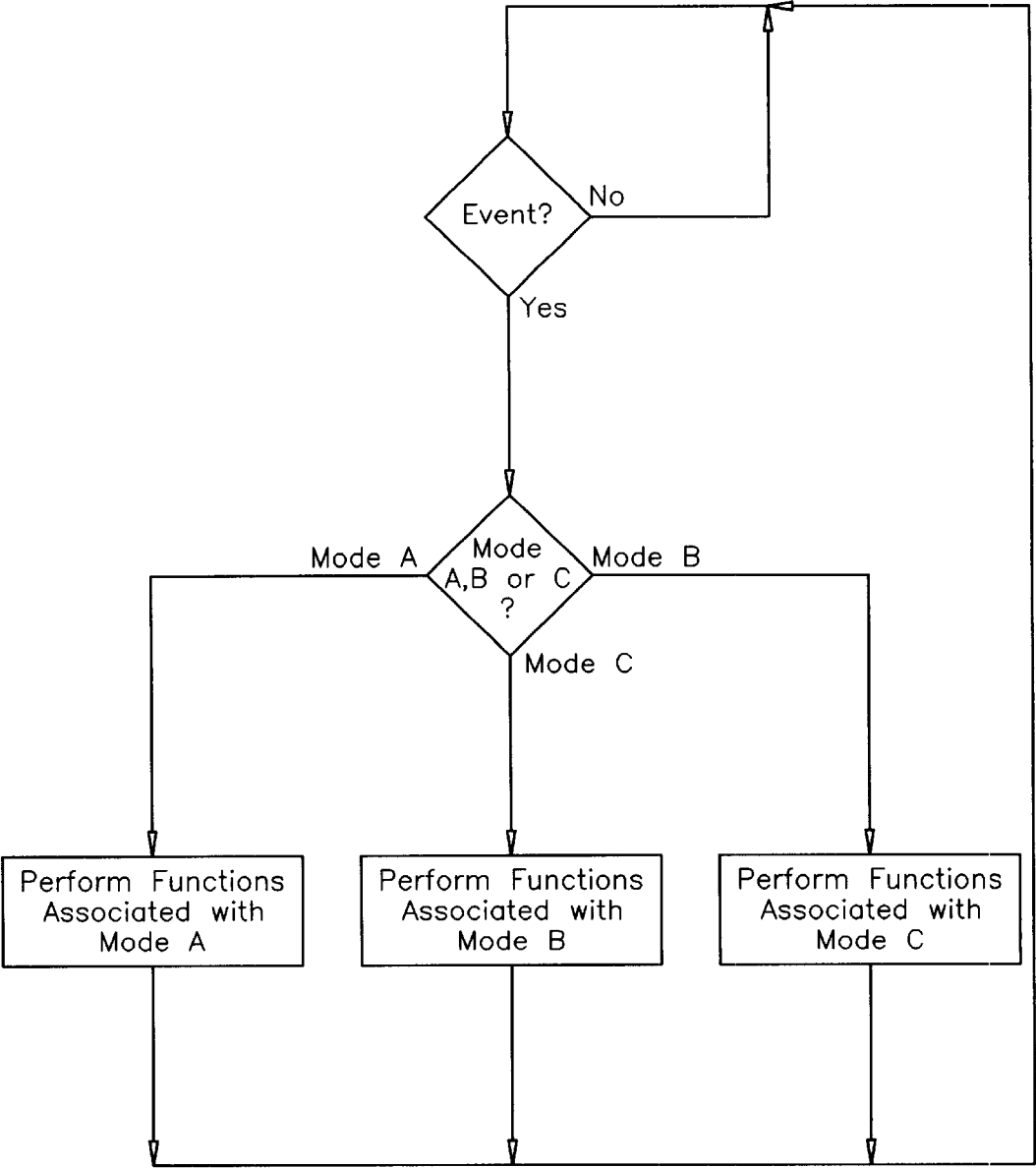


FIG. 9

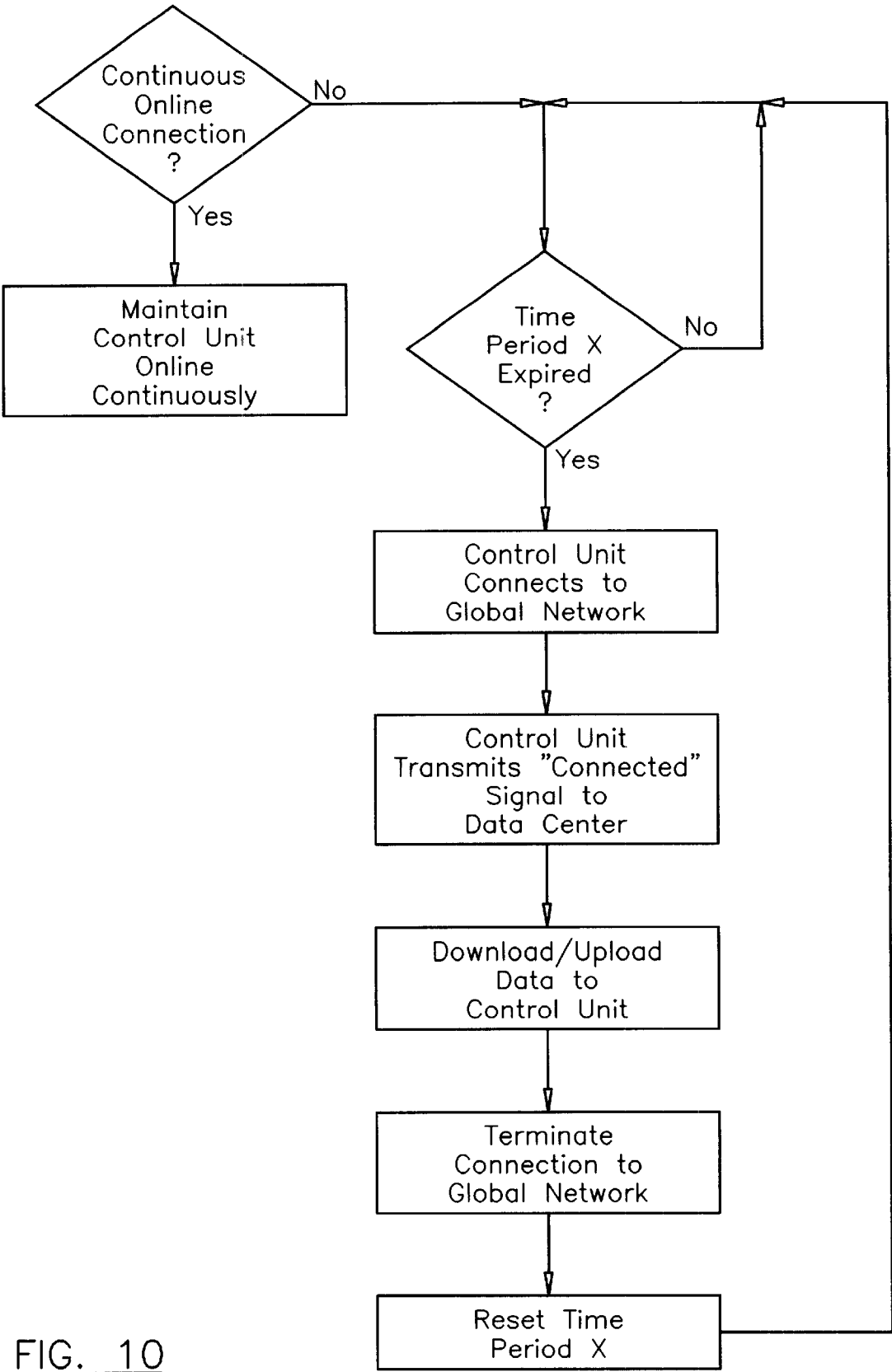


FIG. 10

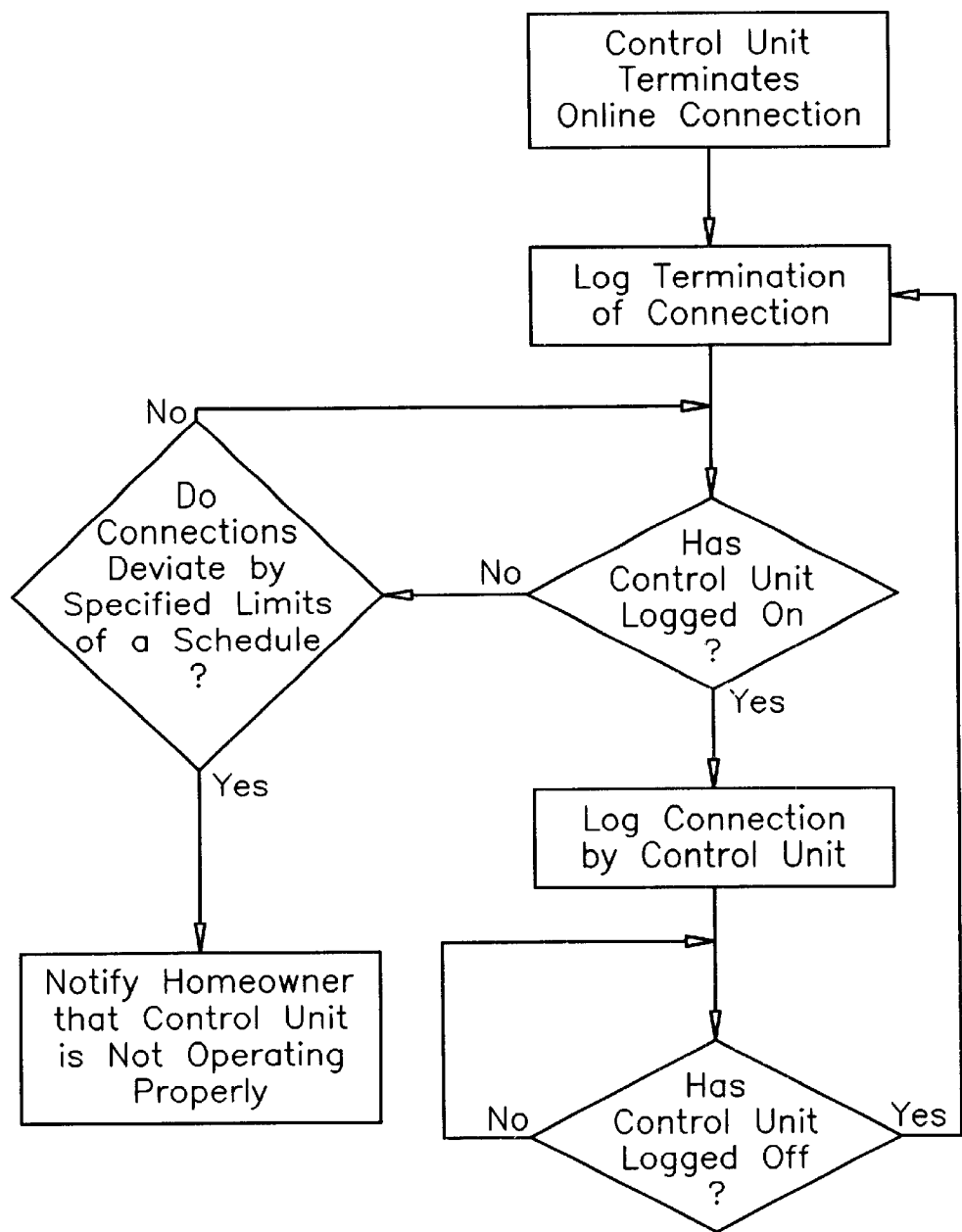


FIG. 11

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**INTERNET BASED HOME
COMMUNICATIONS SYSTEM**

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to home monitoring systems and more specifically it relates to an Internet based home communications system for allowing a homeowner to monitor and control various features of their home from a distant location via a global computer network such as the Internet.

Our society has become extremely mobile with the reduced expense and ease of travel leaving many homes unattended while the homeowner is traveling or at work. Many homeowners hire “house sitters”, friends or neighbors to either monitor or stay at their home during their absence to insure that the home is in the desired condition. Other homeowners are forced to abandon their home without any monitoring or control. Some homeowners have more than one home, such as a summer home, and must leave at least one of the homes unoccupied and unmonitored. Hence, there is a need for a home monitoring system that allows a homeowner to monitor their home from a distant location.

2. Description of the Prior Art

Home monitoring systems have been in use for years. Typically, a home monitoring system is comprised of a security system that notifies the security agency when there has been a breach of security within the residence. The security agency may then call the homeowner at their place of work notifying them of the condition of their home.

However, conventional home monitoring systems do not allow the homeowner to monitor their home from a distant location. In addition, conventional home monitoring systems do not allow the homeowner to control the operations of the home from a distant location. Many homeowners are forced to purchase the services of house sitters that can be expensive and can significantly reduce the privacy most homeowners enjoy and desire to protect.

While conventional home security systems may be suitable for monitoring burglary within a home, they are not as suitable for allowing a homeowner to monitor and control various features of their home from a distant location via a global computer network. Conventional home security systems simply do not allow the homeowner to monitor the conditions of their home while in a remote location without having a third person visit their home.

In these respects, the Internet based home communications system according to the present invention substantially departs from the conventional concepts and functions of the prior art, and in so doing provides a system primarily developed for the purpose of allowing a homeowner to monitor and control various features of their home from a distant location via a global computer network.

SUMMARY OF THE INVENTION

In view of the foregoing disadvantages inherent in the known types of home monitoring systems now present in the prior art, the present invention provides a new Internet based home communications system wherein the same can be utilized for allowing a homeowner to monitor and control various features of their home from a distant location via a global computer network.

The general purpose of the present invention, which will be described subsequently in greater detail, is to provide a

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new Internet based home communications system that has many of the advantages of the home based monitoring systems mentioned heretofore and many novel features that result in a new Internet based home communications system which is not anticipated, rendered obvious, suggested, or even implied by any of the prior art home based monitoring systems, either alone or in any combination thereof.

To attain this, the present invention generally comprises a plurality of control devices positioned within a home, a control unit in communication with the plurality of control devices wherein the control unit is connected to a global computer network (i.e. Internet), and a data center having server computers connected to the global computer network and in communication with the control unit. The control devices may be comprised of various units such as lighting controls, heating controls, moisture controls, freeze controls, pet feeding devices, propane gauge, interior cameras, exterior cameras, security system, smoke alarm and various other devices that can be utilized to monitor and control the home. The homeowner is capable of monitoring and controlling the control device within the home by accessing a web page displayed by the data center through a conventional web browser on a computer. The homeowner can view, monitor and control features of their home through the web page such as viewing interior images of their home or adjusting the thermostat for the interior of their home. In addition, the control unit may notify the appropriate supplier when propane or food becomes low within the home through the global computer network.

There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the invention that will be described hereinafter and that will form the subject matter of the claims appended hereto.

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of the description and should not be regarded as limiting.

A primary object of the present invention is to provide an Internet based home communications system that will overcome the shortcomings of the prior art devices.

A second object is to provide an Internet based home communications system for allowing a homeowner to monitor and control various features of their home from a distant location via a global computer network.

Another object is to provide an Internet based home communications system that allows a homeowner to monitor images taken from within or outside of the home.

An additional object is to provide an Internet based home communications system that allows the homeowner to control features of their home through a global computer network.

A further object is to provide an Internet based home communications system that allows the user to monitor, control and modify various control devices within a home through the Internet.

Another object is to provide an Internet based home communications system that alerts the homeowner through e-mail of various alerts such as a burglary, fire or temperature extremes.

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A further object is to provide an Internet based home communications system that monitors supplies within the home and that can notify product providers of the need for more supplies such as food or heating fuel.

Other objects and advantages of the present invention will become obvious to the reader and it is intended that these objects and advantages are within the scope of the present invention.

To the accomplishment of the above and related objects, this invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that changes may be made in the specific construction illustrated and described within the scope of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other objects, features and attendant advantages of the present invention will become fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views, and wherein:

FIG. 1 is a block illustration of the present invention showing the communication from a homeowner's computer to a control unit within the home through a global computer network.

FIG. 2 is a block diagram of the various types of controls that may be connected to the control unit within the home.

FIG. 3 is a browser containing the control page displaying some of the features of the present invention that allow the homeowner to monitor and control their home through a global computer network such as the Internet.

FIG. 4 is a sample Internet web page displaying various pictures taken from cameras within and outside of the home.

FIG. 5 is a block diagram of the present invention.

FIG. 6 is a flowchart showing the operation of the present invention when an event occurs at the home.

FIG. 7 is a flowchart showing the operation of the present invention when the homeowner accesses the control page from a computer through the global computer network entering a "request" or a "command".

FIG. 8 is a flowchart showing the operation of the control unit as it connects to the data center through the global computer network.

FIG. 9 is a flowchart showing operation of the control unit upon receiving an event utilizing the various modes that may be programmed into the control unit.

FIG. 10 is a flowchart showing the operation of the control unit intermittently connecting to the data center via the global computer network.

FIG. 11 is a flowchart showing the operation of the data center monitoring the online connections from the control unit.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The following description is presented to enable any person skilled in the art to make and use the invention, and is provided in the context of a particular application and its requirements. Various modifications to the disclosed embodiments will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the present invention. Thus, the

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present invention is not intended to be limited to the embodiments shown, but is to be accorded the widest scope consistent with the principles and features disclosed herein.

The data structures and code described in this detailed description are typically stored on a computer readable storage medium, which may be any device or medium that can store code and/or data for use by a computer system. This includes, but is not limited to, magnetic and optical storage devices such as disk drives, magnetic tape, CDs (compact discs) and DVDs (digital video discs), and computer instruction signals embodied in a transmission medium (with or without a carrier wave upon which the signals are modulated). For example, the transmission medium may include a global communications network, such as the Internet.

A. Invention Overview

The Internet based home communications system 10 broadly comprises a plurality of control devices 40 positioned within a home, a control unit 30 in communication with the plurality of control devices 40 wherein the control unit 30 is connected to a global computer network 12 (i.e. Internet), and a data center 20 having server computers connected to the global computer network 12 and in communication with the control unit 30. The control devices 40 may be comprised of various units such as lighting controls 42, heating controls 44, moisture controls 46, freeze controls 48, pet feeding devices 50, propane gauge 54, interior cameras 56, exterior cameras 58, security system 60, smoke alarms 62, health monitoring devices 64 and various other devices that can be utilized to monitor and control the home. The homeowner is capable of monitoring and controlling the control device within the home by accessing a web page displayed by the data center 20 through a conventional web browser 14 on a computer. The homeowner can view, monitor and control features of their home through the web page such as viewing interior images 74 of their home or adjusting the thermostat for the interior of their home. In addition, the control unit 30 may notify the appropriate supplier when propane or food becomes low within the home through the global computer network 12.

B. Data Center

As shown in FIG. 1 of the drawings, a data center 20 comprised of one or more server computers is in communication with a global computer network 12 such as the Internet utilizing a conventional communications system such as a telephone modem, cable modem, digital subscriber line (DSL) integrated services digital network (ISDN), T1, T3, OC3 or other communications system. The data center 20 is capable of receiving, storing and transmitting various types of data related to the homeowner's home such as text, software, music, sound, temperature data, images 74, photographs, graphics, video, alerts, messages, advertisements, promotions or other information related to a home (collectively, the "data").

C. Control Unit

As further shown in FIG. 1 of the drawings, a control unit 30 is in communication with the data center 20 through the global computer network 12 utilizing a conventional communications system such as a telephone modem, cable modem, digital subscriber line (DSL) integrated services digital network (ISDN), T1, T3, OC3 or other communications system. The control unit 30 is capable of communicating with the data center 20 and other entities 80 through the global computer network 12. The control unit 30 may be comprised of conventional electronics well-known in the art. The control unit 30 further can be connected to local computers within the home thereby allowing the homeowner to control and monitor the home through the control unit 30.

The control unit 30 can be programmed to connect to the global computer network 12 either full-time, periodically or only when an event occurs from one of the control devices 40. As shown in FIG. 10 of the drawings, the control unit 30 may be programmed to connect online to the data center 20 based upon a specified period X or upon scheduled intervals. As further shown in FIG. 10 of the drawings, the control unit 30 connects to the global computer network 12 and then transmits a "connected" signal to the data center 20 to inform the data center 20 that it is connected online. The control unit 30 then may upload any scheduled or requested data to the data center 20 as further shown in FIGS. 8 and 10 of the drawings. The control unit 30 may also download any data from the data center 20 such as commands from the homeowner. After the data has been properly uploaded and downloaded, the control unit 30 terminates the connection to the global computer network 12 while simultaneously resetting the time period X. After time period X has passed again, the control unit 30 repeats the above connection process to the data center 20.

As shown in FIG. 11 of the drawings, the data center 20 monitors the logon activity of the control unit 30. If the control unit 30 deviates from the specified limits of a schedule, the data center 20 may notify the homeowner that the control unit 30 is not connecting to the data center 20 as scheduled and that there may be problems with the control unit 30.

D. Control Devices

As shown in FIG. 2 of the drawings, the control unit 30 is in communication with various control devices 40 such as lighting controls 42, heating controls 44, moisture controls 46, freeze controls 48, pet feeding device, grocery bar code reader 52, propane gauge 54, interior still and video cameras, exterior still and video cameras, security system 60, alarms (smoke, carbon monoxide, etc.), alerts and other control devices 40. As shown in FIG. 5 of the drawings, the control unit 30 is in communication with the control devices 40 through various means such as radio, infrared, cable, X10 or other known communication means.

The control devices 40 may be capable of receiving, storing and transmitting data to and from the control unit 30 depending upon the desired usage. For example, the lighting controls 42 would mainly receive data from the control unit 30 directing the lighting controls 42 to turn on specific lighting or to turn off specific lighting. It can be appreciated that the lighting controls 42 may be capable of transmitting data to the control unit 30 regarding which lights are activated and deactivated which is forward to the data center 20 through global computer network 12. The various other control devices 40 are capable of receiving, storing and transmitting data as required for their specific operation and programming.

E. Alerts and Events

A specific type of control device 40 may be utilized which provides merely an "alert" as to specific conditions within the home as shown in FIG. 5 of the drawings. For example, a grocery bar code reader 52 can be utilized to monitor the supply of groceries within the home, a propane gauge 54 to monitor the level of propane within a tank, smoke alarms 62 to monitor fire conditions within the home, a security system 60 to monitor the home for intrusions, and pet feeding devices 50 to monitor the supply of food for a pet.

When the groceries, propane, smoke, security conditions and pet food within the home reach a preprogrammed threshold level, an alert signal is transmitted to the control unit 30 by the specific control device 40 signaling that a threshold condition has been breached. As shown in FIG. 6

of the drawings, if the event is a "LOW LEVEL" event, the control unit 30 simply logs the event for later reporting. If the event is a "HIGH LEVEL" event, the control unit 30 may notify the data center 20 which can then notify the homeowner of the condition via e-mail, pager, web page, by direct telephone call or other communication means. The control unit 30 or the data center 20 may also notify auxiliary services 80 through the global computer network 12 that the home is in need of specific supplies such as food, pet food or propane, or that a security breach has occurred so that the appropriate services or goods may be provided.

F. Modes

As shown in FIG. 9 of the drawings, there can be more than one "mode" for the control unit 30 to have depending upon various factors. For example, there may be a "HOME" mode for use when the user is at home, an "AWAY" mode when the user is away from home, and a "SLEEP" mode for nighttime hours. There may also be various "routines" within each of the above-stated modes such as a "WEEK-END" routine, "WEEKDAY" routine, and a "VACATION" routine.

When an event is detected and reported to the control unit 30 by one of the control devices 40 such as the security system 60, the control unit 30 first determines which mode it is currently in. For example, if in HOME mode, the control unit 30 may only provide an audible alarm within the interior of the home. If in AWAY mode, the control unit 30 may turn on the lights within the home, connect online to signal a security agency, and contact the homeowner directly. If in SLEEP mode, the control unit 30 may turn on the lights within the home and simultaneously sound an audible alarm. As can be appreciated, there are various combinations that may be achieved with the various modes programmable into the control unit 30.

G. Control Page

As shown in FIGS. 1, 3 and 4 of the drawings, the homeowner can access data regarding their home through a conventional web browser 14 upon the user's computer. The homeowner can access their specific "control page" 76 upon the web site by using a user name and password or any other acceptable means for accessing the data from their home. The control page 76 can have various structures, design and information available for the homeowner. In addition, the control page 76 may be customizable for allowing only the desired information upon the control page 76 such as the customized information 70 portion of the control page 76. The control page 76 may be customized to display one or more images 74 of a specific home along with customized information 70 relating to weather conditions and other information.

The homeowner can select which home they desire to receive data from by selecting the appropriate home within the home selector 72. As shown in FIG. 4 of the drawings, the homeowner can view images 74 of the interior and exterior of their home through the web browser 14 by selecting the section containing the images 74. The user can view either still images 74 or video images 74 as desired. It can be appreciated that various other features may be utilized for monitoring the images 74 of the home.

H. Modifying Control Unit Settings

If the homeowner desires to modify any preprogrammed settings within the home, such as lighting control or thermostat control, the homeowner simply selects the desired feature upon the control page 76 of the desired home as shown in FIGS. 3 and 7 of the drawings. The homeowner may then enter the desired data into the computer 16 which is transmitted to the data center 20 which forwards the

information directly to the control unit 30 which transmits the data accordingly modifying any previous settings. This process continues until the user logs out of the control page 76.

I. Data Manipulation

The control unit 30 and the data center 20 constantly monitor data received from the control devices 40 during usage. The data accumulated, such as gas and electricity consumption, may be compiled to locate inconsistencies and deviations. For example, if the electricity consumption within the home increases by 10% over a period of time a warning may be provided to the homeowner informing them of the deviation. It can be appreciated that various other types of data manipulation may be utilized with the present invention.

J. Control Unit Security

It is an essential feature of the present invention that the control unit 30 always connects to the data center 30 and that the control unit 30 cannot be directly connected to for preventing unauthorized access to the control unit 30. As shown in FIG. 7 of the drawings, when the homeowner accessing the control page 76 enters a “REQUEST”, “COMMAND”, or “ORDER” the data center 20 sends a “connect” command to the control unit 30. If online, the control unit 30 will then establish a direct connection with the data center 20 thereby allowing the control unit to connect only to the authorized data center 20 and not an unauthorized party.

K. Operation

In use, the user programs the desired settings into the control unit 30 either directly at the home or via the data center 20 through an external computer 16. As shown in FIG. 6 of the drawings, when a condition within the home reaches a warning level (i.e. an “event”) such as low propane, the control unit 30 sends an alert to the data center 20 through the global computer network 12. The data center 20 may notify an auxiliary service such as a fire department or propane store informing them of the home’s condition. The data center 20 would also provide relevant information to the auxiliary service regarding the home such as the owner’s name, telephone number, address of the home and other relevant information. In addition, the data center 20 may also send an alert to the homeowner through various types of communication means such as e-mail, pager, warning upon the control page 76, personal call or other communication means.

The homeowner may connect to the data center 20 through a conventional web browser 14 or other software program through a computer 16 as shown in FIGS. 3 and 7 of the drawings. The homeowner may have a home that is shown as a default upon the control page 76. However, the homeowner may also select a home to view information about if they have more than one home connected to the data center 20 with a control unit 30. The homeowner may then select which home they desire to either “request” information about or provide a “command” to. If the homeowner simply desires to receive information about a home, they can select the item that they desire to receive information about such as the interior temperature of the home or images 74 within the home. As shown in FIG. 7 of the drawings, the data center 20 transmits a “connect” command to the control unit 30. If the control unit 30 is online and receives the connect command, the control unit 30 then transmits a connected signal to the data center 20 thereby establishing a secure connection to the control unit 30. The data center 20 may then request from the control unit 30 the desired information if not currently updated. The control unit 30

then uploads the requested data to the data center 20 and receives any commands from the data center 20 that the homeowner previously programmed into the data center 20 through the control page 76. The data center 20 then transmits to the homeowner the desired data for viewing.

As to a further discussion of the manner of usage and operation of the present invention, the same should be apparent from the above description. Accordingly, no further discussion relating to the manner of usage and operation will be provided.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed to be within the expertise of those skilled in the art, and all equivalent structural variations and relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

Index of Elements for Internet Based Home Communications System

Environmental Elements

- 10. Internet Based Home Communications
- 11.
- 12. Global Computer Network (Internet)
- 13.
- 14. Browser
- 15.
- 16. User’s Computer
- 17.
- 18.
- 19.
- 20. Data Center
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- 29.
- 30. Control Unit
- 31.
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- 36.
- 37.
- 38.
- 39.
- 40. Control Devices
- 41.
- 42. Lighting Controls
- 43.
- 44. Heating Controls
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- 46. Moisture Controls
- 47.
- 48. Freeze Controls
- 49.
- 50. Pet Feeding Device
- 51.
- 52. Grocery Bar Code Reader
- 53.
- 54. Propane Gauge
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- 56. Interior Cameras
- 57.
- 58. Exterior Cameras
- 59.
- 60. Security System
- 61.
- 62. Smoke Alarms
- 63.
- 64. Health Monitoring Devices
- 65.
- 66.
- 67.
- 68.
- 69.
- 70. Customized Information
- 71.
- 72. Home Selector
- 73.
- 74. Images
- 75.
- 76. Control Page
- 77.
- 78.
- 79.
- 80. Auxiliary Services

We claim:

1. An Internet based home communications system, comprising:

- a control unit in communication with at least one control device, wherein said control unit is capable of being in communication with a global computer network; and
- a data center in communication with said control unit through said global computer network, wherein said data center provides a control page through said global computer network for a user to access, said control page including a home selector section allowing said user to select between multiple homes.

2. The Internet based home communications system of claim 1, wherein said control unit provides alerts to said data center when a restriction is violated.

3. The Internet based home communications system of claim 2, wherein said data center provides alerts to said user through a communication means.

4. The Internet based home communications system of claim 3, wherein said communication means is comprised of e-mail.

5. The Internet based home communications system of claim 3, wherein said communication means is comprised of a notice upon said control page.

6. The Internet based home communications system of claim 1, wherein said at least one control device is comprised of at least one interior camera.

7. The Internet based home communications system of claim 6, wherein said at least one control device includes at least one exterior camera.

8. The Internet based home communications system of claim 7, wherein said interior camera and said exterior camera are capable of providing video images.

9. The Internet based home communications system of claim 8, wherein said at least one control device further includes at least one lighting control, at least one temperature control, at least one moisture control, at least one freeze control, at least one pet feeding device, at least one grocery bar code reader, at least one propane gauge, at least one security system, at least one smoke alarm and at least one carbon monoxide alarm.

10. The Internet based home communications system of claim 1, wherein said at least one control device includes a security system.

11. The Internet based home communications system of claim 1, wherein said control page is customizable.

12. The Internet based home communications system of claim 1, wherein said control unit is programmable from said control page by said user.

13. The Internet based home communications system of claim 12, wherein said control unit controls said at least one control device.

14. The Internet based home communications system of claim 1, wherein said control unit accesses said global computer network at periodic intervals.

15. The Internet based home communications system of claim 1, wherein said data center stores still images and video images received from said control unit.

16. The Internet based home communications system of claim 15, wherein said data center provides an image gallery for said user to view containing said stored still images and said video images.

17. The Internet based home communications system of claim 1, wherein said at least one control device is capable of receiving data, storing data and transmitting data through said global communications network.

18. The Internet based home communications system of claim 1, wherein said data center forwards said alerts to an appropriate auxiliary service.

19. The Internet based home communications system of claim 18, wherein said alerts contain home information, wherein said home information includes address and homeowner information.

20. An Internet based home communications system, comprising:

- a control unit in communication with at least one control device within a home, wherein said control unit is capable of being in communication with a global computer network;
- a data center in communication with said control unit through said global computer network;
- a control page provided by said data center through said global computer network for a user to access; and
- wherein said control page includes access by said user to more than one home through a home selector section, and wherein said control page is customizable.

21. The Internet based home communications system of claim 20, wherein said control unit provides alerts to said data center when a restriction is violated.

22. The Internet based home communications system of claim 21, wherein said data center provides alerts to said user through a communication means.

23. The Internet based home communications system of claim 22, wherein said communication means is comprised of e-mail.

24. The Internet based home communications system of claim 22, wherein said communication means is comprised of a notice upon said control page.

25. The Internet based home communications system of claim 22, wherein said control unit controls said at least one control device.

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26. The Internet based home communications system of claim 20, wherein said at least one control device is comprised of at least one interior camera.

27. The Internet based home communications system of claim 26, wherein said at least one control device includes at least one exterior camera.

28. The Internet based home communications system of claim 27, wherein said interior camera and said exterior camera are capable of providing video images.

29. The Internet based home communications system of claim 28, wherein said at least one control device further includes at least one lighting control, at least one temperature control, at least one moisture control, at least one freeze control, at least one pet feeding device, at least one grocery bar code reader, at least one propane gauge, at least one security system, at least one smoke alarm and at least one carbon monoxide alarm.

30. The Internet based home communications system of claim 20, wherein said at least one control device includes a security system.

31. The Internet based home communications system of claim 20, wherein said control page includes a home selector section allowing said user to select between multiple homes.

32. The Internet based home communications system of claim 20, wherein said control page is customizable from a conventional web browser.

33. The Internet based home communications system of claim 20, wherein said control unit is programmable from said control page by said user.

34. The Internet based home communications system of claim 20, wherein said control unit accesses said global computer network at periodic intervals.

35. The Internet based home communications system of claim 20, wherein said data center stores still images and video images received from said control unit.

36. The Internet based home communications system of claim 26, wherein said data center provides an image gallery for said user to view containing said stored still images and said video images.

37. The Internet based home communications system of claim 20, wherein said at least one control device is capable of receiving data, storing data and transmitting data through said global communications network.

38. The Internet based home communications system of claim 20, wherein said data center forwards said alerts to an appropriate auxiliary service.

39. The Internet based home communications system of claim 29, wherein said alerts contain home information, wherein said home information includes address and home-owner information.

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40. An Internet based home communications system, comprising:

a control unit in communication with at least one control device within a home, wherein said control unit is capable of being in communication with a global computer network;

a data center in communication with said control unit through said global computer network; and

a control page provided by said data center through said global computer network for a user to access, wherein said control page includes access by said user to more than one home through a home selector section and wherein said control page is customizable, wherein said control page is customizable from a conventional web browser;

wherein said control unit provides alerts to said data center when a restriction is violated;

wherein said data center provides said alerts to said user through a communication means;

wherein said alerts contain home information, wherein said home information includes address and home-owner information;

wherein said at least one control device is comprised of at least one interior camera and at least one exterior camera, wherein said interior camera and said exterior camera are capable of providing video images;

wherein said control page includes a home selector section allowing said user to select between multiple homes;

wherein said control unit is programmable from said control page by said user;

wherein said control unit accesses said global computer network at periodic intervals;

wherein said data center stores still images and video images received from said control unit;

wherein said data center provides an image gallery for said user to view containing said stored still images and said video images;

wherein said at least one control device is capable of receiving data, storing data and transmitting data through said global communications network;

wherein said data center forwards said alerts to an appropriate auxiliary service.

41. The Internet based home communications system of claim 40, wherein said at least one control device further includes at least one lighting control, at least one temperature control, at least one moisture control, at least one freeze control, at least one pet feeding device, at least one grocery bar code reader, at least one propane gauge, at least one security system, at least one smoke alarm and at least one carbon monoxide alarm.

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